

PAPER TITLE ***DOES THE DISCIPLINE OF PROJECT CONTROLS REALLY ADD VALUE?***

KEY WORDS Project Controls, Project Management & Oil & Gas

SPEAKER PROFILE

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Debbie has 10 years experience in the Oil & Gas industry in Australia. Working in the offshore projects area Debbie has been involved in brownfield upgrades and greenfield subsea projects. With her core experience in the project controls disciplines of planning and cost control. Debbie is currently the Project Services Manager on one of Woodside's current offshore projects. Debbie has a degree in Project Management.



PAPER SUMMARY

Starting with a definition of Project Controls this paper addresses the question - have we improved our project management and controls over the years? This leads to the current Oil & Gas industry perspective – where have we come from and where are we now? Including topics such as benchmarking, technological advancement, contracting trends and experience availability. To conclude, the paper outlines how Woodside Energy Ltd, Australia's largest Oil & Gas Operator is moving forward to ensure that the discipline of Project Controls remains a value-adding component of project teams.

PAPER SUBMISSION

This paper discusses the development of Project Controls in the Oil & Gas Industry over the last 20 years. Setting the scene is an overview of recent research by Independent Project Analysis which answers the question – have we improved our project management and controls over the years? From this context of recent project performance, the paper addresses the current industry perspective - where have we come from and where are we now? Key changes in our project controls over the past 20 years will be reviewed, including the use of benchmarking and front-end-loading tools, technological advancement, contracting strategy trends and experience availability. In evaluating these areas of project controls, the paper explores pros and cons of the current ways of working.

To conclude, the discussion will review how Woodside Energy Ltd, Australia's largest Oil & Gas Operator with a forecast capital to be spent of approximately A\$8 billion over the next 6-8 years is moving forward to ensure that the discipline of Project Controls remains a value-adding component of project teams.

WHAT IS THE DISCIPLINE OF PROJECT CONTROLS?

There are many definitions of Project Controls used across industries and indeed across companies within industries. For the purposes of this paper, the field of project controls is defined as follows:

The application of knowledge, skills, tools and techniques to project activities, in order to establish appropriate project baselines and facilitate proactive performance management by providing consistent, accurate and timely information to the project team.

At the core of project controls in this definition are the disciplines of cost engineering (estimating), cost control and planning (scheduling). In this definition, when the process of project controls is performed in a true value-adding sense, project controls practitioners should provide a 'navigator' function to the project 'pilot', the Project Manager.

THE FACTS – RECENT OIL & GAS MEGA PROJECT PERFORMANCE

The 1970s were called the era of mega projects, with many new frontiers being opened such as the North Sea where billions of dollars were invested in Oil & Gas projects. Analysis of these 1970s mega projects concluded that they routinely failed to achieve their objectives. These failures were mainly due to the management of project interfaces, for example, regulatory and infrastructure. With the learnings of the 70s and the availability of more established infrastructure, there is a perception that our management practices have 'caught up' with the complexities of mega projects. So, did project performance in the 80s & 90s support this perception? A recent study by Independent Project Analysis, 'Mega-field developments require special tactics, risk management' (Offshore, June 2003 P90-96 Edward Merrow), sought to answer this question...

The Study

IPA reviewed 14 mega projects in the past 20 years:

- All field developments, 11 offshore developments
- Excluding heavy oil developments
- Projects were extracted from the IPA database of over 700 projects
- All were executed by major petroleum companies
- All projects were considered 'significant' by their Owners

Cost Results

Average cost growth over 14 projects = 46% or \$11.8 billion in total:

- Average growth in non-mega projects in the same period = 2%
- Facilities rather than well construction were the primary cause of growth
- 2 projects under-ran, 1 by over 25%
- 3 projects were within 15% of authorisation
- 2 projects experienced between 20-40% growth
- 7 projects (half the sample) experienced over 40% growth, IPA call these **The 'Dogs'!**

Schedule Results

Average schedule slip over 14 projects = 28%, with a mean of 13%:

- 6 projects were completed within 15% of original schedule
- 6 projects slipped by 20% or more
- Non-dog projects average slip in the same period was 2%
- 'Dog' projects slipped an average 39%

Characteristics of 'Dogs'

Based on these results IPA further reviewed characteristics of 'Dogs', these common characteristics provide insight into why these projects' failed to meet cost & schedule expectations:

- Project objectives not fully documented at authorisation
- Aggressive cost targets
- The project was schedule driven with an aggressive schedule
- Project team was not integrated
- Use of value-improving practices was low
- Front-end loading (project definition) was poor

In Summary...

IPA concluded that despite another 20 years of experience:

- We have seen no material progress in the control of large developments
- Only 3 of the 14 projects examined could genuinely be called successful
- The issues facing these mega projects differed from those of the 70s - the failure of these developments to achieve project outcomes relates to poor business and project management - not interface management

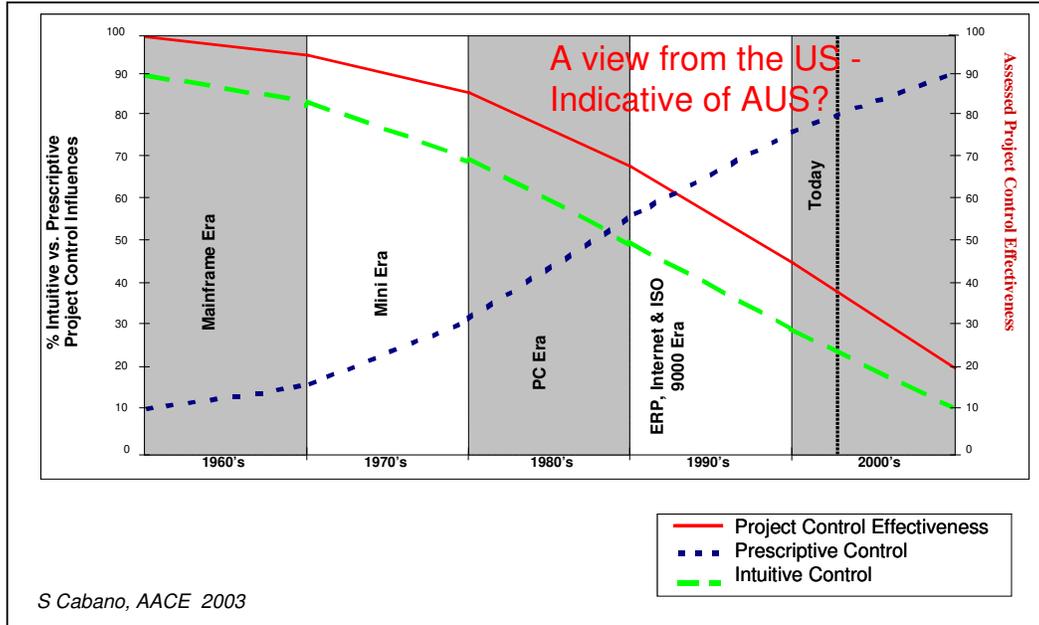
WHERE ARE WE NOW?

In the 70's and early 80's the Oil & Gas industry developed reserve-rich first world locations, for example, the North Sea off Scotlands' East coast, the Gulf of Mexico and Australia's North West Shelf off the coast of Western Australia. With these large resource-rich locations experiencing a production plateau or even decline, the large Operating Companies began developing more marginal fields in these established locations and/or in relatively new locations, for example, Africa, Russia and China. With investors demanding 'more bang for their buck', the pressure is on Oil & Gas companies to deliver marginal fields in an economically robust manner and explore and develop new regions in a cost-effective way.

So what does this mean for project controls? Effectively we are operating in an environment where more is demanded from less. This, coupled with technological advancement, changes in contracting strategy trends, experience depletion and reliance on external benchmarking, makes for a challenging environment to deliver effective project controls.

Technological Advancement

Over the past 20 years advances in technology have driven immense change in all aspects of business. These advances designed to save time and increase organisational effectiveness are marketed to offer a greater level of project controls to organisations. With electronic system integration and web-based reporting, data are more easily compiled and made visible with physical location no longer a boundary to data flow. Therefore, why is it that one school of thought concludes that there could be a negative correlation between technological advancement and project control? The chart below extracted from a paper presented at the 2003 AACE conference depicts the decline in project controls with the onset of technological advancement:



The trend shown in this chart is representative of recent experiences in Australia where computer literate resources who lack basic project controls knowledge are evident in our industry. This reliance on system-generated information and lack of core knowledge results in prescriptive control versus intuitive control as shown above. Another interesting consideration is the amount of manhours expended in a week feeding information into these systems rather than communicating face-to-face with the project team. Electronic distribution of reports via email was a paper-saving revolution - this communication-reducing development has progressed one step further, now we have web-based systems with traffic lights which are designed to guide a project manager's efforts!

The money companies invest in these integrated systems can give a false sense of security about project controls and can lead to companies employing less experienced personnel as a result of the amount of data-entry activity which is required to support them.

There is a balance between people know-how and system support. I believe we are at the peak of system development and use and now need to re-invest in people to ensure value is delivered from the information that these systems hold.

Contracting Strategy Trends

Supporting the global trend of cutting back corporate organisations, the Oil & Gas Industry has out-sourced, where possible. This has resulted in Owner organisations lacking the skills to execute projects, leading to many large Engineer, Procure and Construct (EPC) type contracts. In many of these relationships, the 'lean and mean' Owner teams rely on contractor organisations to supply project controls expertise.

Over the past 3-5 years with project performance not always improving under these new structures, this trend is now being questioned. IPA research indicating that projects with Owner

project controls representation correlate positively with project success has supported this re-assessment.

Although EPC contracts will continue to be used to deliver projects, the make-up of the Owner team must contain the right mix of skills to support the contractor and ensure the best interests of the Owner are managed. This does not mean man-marking the contractor - it may simply mean providing clear reporting expectations up-front and on-going governance checks.

It is evident in recent Oil & Gas projects in Australia that project controls resources are again becoming recognised as key resources for the Owner to retain; in fact, we are now at the stage of possibly having too many resources in Owner organisations! Although it can be difficult to attain the optimal balance between Owner and contractor project controls personnel, this recent trend of including project controls resources in the Owner team represents a positive way forward.

Experience Depletion

This topic poses the question where is our next generation of Project Controls practitioners coming from? For many societal and business reasons, there is a general trend in the workforce which has resulted in a peak age group in the mid-50's with the next largest in the mid-20's. With many people opting for early retirement, this trend is a concern as without sufficient development of our younger resources, many companies are going to experience a knowledge gap. The situation worsens as organisational down-sizing has resulted in much of our core competence and experience being lost.

Historically many project controls personnel came from a technical background, ie engineering. This provided them with an inherent knowledge of project execution and the ability to add value to project information. However, in recent times, project controls, a relatively young discipline without a stand-alone tertiary education program has been influenced by the use of technology, making system familiarisation, ie Primavera, a guide to project controls knowledge rather than project background.

In project controls teams today, it is common to see a mix of young system literate people with a sprinkling of the older, more experienced but less computer literate personnel. The need to formally tap into this experienced resource pool to develop younger personnel is essential for the continued strengthening of the project controls discipline.

Maybe now is the time for the emergence of a university program specifically aimed at project controls for construction. At the very least, without this formal education, companies can implement formal apprenticeships / graduate training programs to develop the next generation of valuable project controls resources.

External Benchmarking

The increased reliance on external benchmarking in recent years is a direct result of the need to demonstrate governance and assurance of project success in times where the investment market is very competitive. Whether benchmarking takes the form of a cost and/or schedule assessment against historical projects, such as the service offered by the PACE Performance Forum or a more encompassing review such as the IPA or SimVision Front End Loading Analysis, many of the large Oil & Gas companies are involved.

The keys to a valuable benchmarking exercise include:

- Ensuring that it is executed at the right time for the project -
Timing is a double-edged sword, the project needs to have a well-developed design, estimate and schedule to give a true bench-mark while leaving enough time before final investment to make any changes necessitated by the benchmarking.
- Having a realistic data comparison -
Comparable data can be difficult to find for certain project types and some geographical locations. For example, benchmarking Australian projects against those executed in the North Sea can lead to more questions than answers.
- Understanding the methodology followed –
After a benchmarking exercise is complete, it is the project controls team who need to understand, and as required, use the results. In addition, to demonstrate governance the

project team needs to be able to present the benchmarking process and results to external parties including investors.

Overall, well-performed benchmarking can provide invaluable information to the project team, and a level of governance to external parties; however, the process and its use needs to be closely managed to ensure value-eroding does not replace the intended value-adding of this tool.

WHAT DO WE NEED TO DO?

All of the discussion points above are inter-related; therefore, to work towards an improved delivery of project controls in this ever-changing climate, we need to break the cycle. The next section of this paper addresses what Woodside Energy Limited is doing to tackle the issues, where we have been and where we are going.

Woodside Energy Limited

Woodside Energy Limited (WEL) is a leading Australian resources company and one of Australia's most successful explorers, developers and producers of hydrocarbon products. As part Owner and sole Operator of the North West Shelf Venture, Woodside plays a significant role in Australia's largest natural resources development. Other Owners of the North West Shelf Venture include BHP Billiton, BP, Chevron Texaco, MIMI & Shell.

Over the next 6-8 years, Woodside has a forecast capital to be spent of A\$8 billion, which includes various developments in the North West Shelf, facilities deployment in other Australian locations and new international ventures.

Background

In 1998 Woodside put together a cross-organisational team to develop a 'best practice' project management capability for the company. The drive for this review came from some recent unsuccessful projects and a large capital portfolio in years to come. Researching various sources including other participants in the North West Shelf Venture, the team identified the key process and people characteristics required to deliver successful projects.

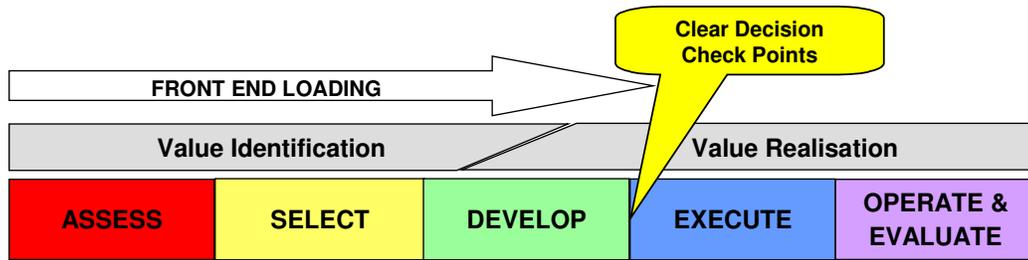
Based on these findings, Woodside developed and introduced the Opportunity and Project Realisation Process, or OPREP – which defines the Woodside way of developing and realising value from opportunities by offering a structured and systematic approach to project development and execution. The 9 guiding principles of the OPREP are:

- Value focussed – maintain focus on key value drivers
- Team based – make use of appropriate multi-functional teams
- Consistency – improves efficiency & fosters communication, a common language
- Decision driven – do only work necessary to support next decision milestone
- Full life cycle – always consider full life cycle
- Buy-in / use processes at all levels – with management commitment deploy across organisation
- Benchmark performance – to measure the rate of improvement
- Process tailored to meet specific needs – build on existing systems
- Lessons learned & best practice – sharing experiences across the organisation

OPREP is similar to other systems used by major Oil & Gas operating companies around the world.

How the Process Works

Through a 5-phase approach, the OPREP defines the stages in a business opportunity / project lifecycle. A decision check point punctuates each phase.



An overview of the OPREP process is shown below. In simplistic form, it shows the roadmap of the 5 OPREP phases, this process model ensures that value and risk is always known, governance is assured by the assurance checks (gates) at key decision points and good front end loading is promoted as opportunities can be stopped, held or recycled.

SUMMARY OF OPREP PROCESS

	PHASE 1 ASSESS	PHASE 2 SELECT	PHASE 3 DEVELOP	PHASE 4 EXECUTE	PHASE 5 OPER&EVAL
OBJECTIVE	Determine potential value of the opportunity & alignment with the business strategy	Generate and select the preferred opportunity alternative	Finalise scope, cost, schedule and get project funded	Produce an operating asset consistent with scope, cost and schedule	Start-up, operate, evaluate asset to ensure performance specifications & maximum return to shareholders
KEY DELIVERABLES	Valuation Report	Development Plan	Business Proposal Package	Functional Assets	Performance Assessment
KEY DECISIONS	Approve Feasibility Study	Approve Development Plan	FID Approval	Operations Acceptance	Value Enhance
KEY ASSURANCE CHECKS	• Project Initiation Review	• Feasibility Review • Development Plan (Concept Selection) Review	• Final Investment Decision Review	• Pre Start Review	• Post Investment Review

The key assurance checks shown above are supplemented by other mandatory or optional assurance checks, while the key checks relating directly to project controls include benchmarking, estimate assurance and cost & schedule risk analysis and Final Investment Decision known as Assurance Check 4. A summary of these assurance checks is given below:

Benchmarking

This review looks for a demonstration that

- The quality of Front-End-Loading (FEL) and the level of definition of the project are at a level where a request for investment funds can be made.
- Value Improving Practices (VIPs) have been used to maximise the value of the opportunity.
- The project cost estimate, schedule and contingency allowances proposed are appropriate for the type of project.
- The project Benchmarks well against what the Industry/Best-in-Class companies deliver.

Woodside uses Independent Project Analysis, Inc. (IPA) for benchmarking projects. The IPA database contains detailed information on a large number of downstream and upstream major projects, and currently is accumulating a larger database on small upstream projects.

Estimate Assurance and Cost & Schedule Risk Analysis

The Estimate endorsement process is aimed at ensuring that estimates are compliant with the principles of the corporate Cost Engineering Guideline and seeking consistency in Cost Estimating throughout Woodside.

The process requires an endorsement of the class of estimate with a defined accuracy and contingency, which is verified by Schedule and Cost Risk Analyses. Both the endorsement review and risk analysis are performed by an independent specialised team of Woodside resources.

Final Investment Decision – Assurance Check 4

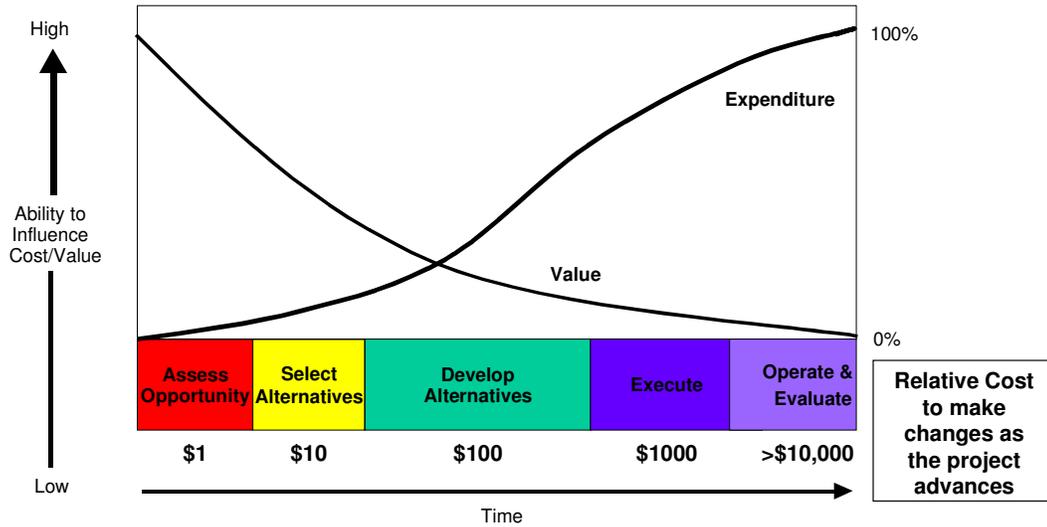
This review is done to provide support for the Final Business Proposal (end of Develop Phase), and to give confidence to stakeholders that the decision to proceed with project execution is sound and ready to move to the Execute Phase. This review occurs during Develop (Phase 3) and after the Basis of Design (BoD) and Project Specification have been finalised and the Project Execution Plan (PEP) and commitment plans are established.

The review looks for a demonstration of:

- Project Objectives are clearly defined and plans for execution are in place, and aligned with those Objectives.
- Key Stakeholders are aligned with plans for execution: plans cover their ongoing engagement/management.
- Full project scope is expressed in tangible cost, time and resources with sufficient accuracy and a strategy is in place to further reduce costs / increase value.
- Economic screening has been appropriately updated and maximum value has been achieved.
- The risk and opportunity management plan is maintained and robust.
- Project execution and contracting strategies and plans are appropriate for the level of definition, residual risk and uncertainty aligned with the Business Environment and market conditions. Planned contracting tactics are optimum and cover both the major and minor contracts.
- The required management systems, processes and procedures including Project Execution Plan, HSE, Quality Management, Project and Contract Controls as well as the financial controls (eg HR, IT and External Affairs support etc.) are all clearly defined and in place to support the venture/project during the Execute Phase.
- Appropriate review and audit plans are in place for the Execute Phase and the operations handover.
- The commissioning and handover strategy has been developed.
- The plans to mobilise operations and maintenance resources, systems, processes and procedures are in place.
- The key Project personnel are in place to initiate execution according to the plan.
- The project resource plan and the organisation are optimum and can be mobilised in accordance with the schedule.
- Linkage to the Asset Reference Plan (ARP) has been updated.
- The License to Operate is in place.

How does the Process Add Value?

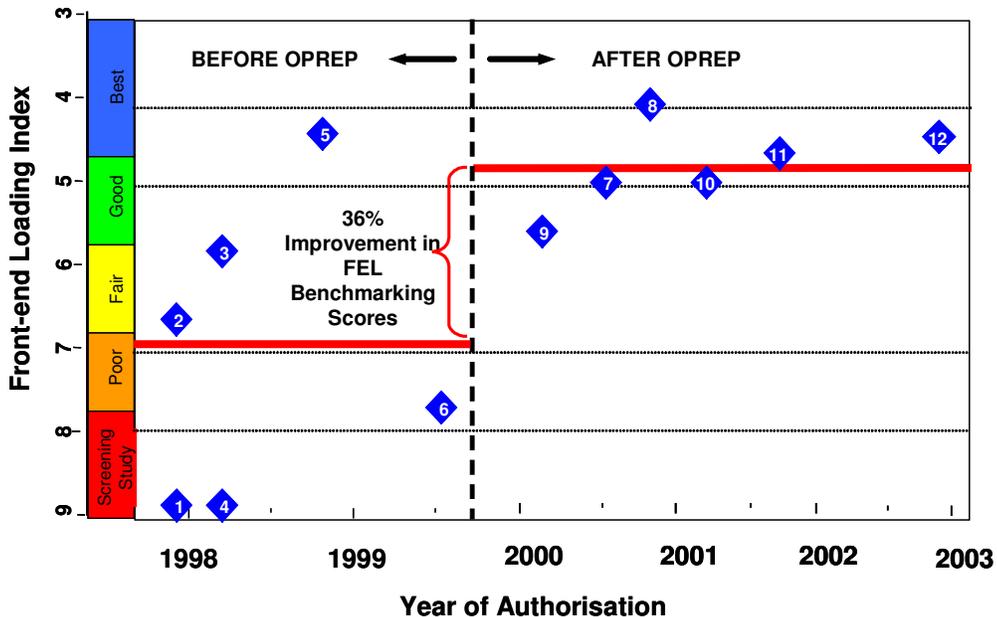
The focus of the initial phases is to identify and maximise the value of an opportunity, the objective of the remaining phases is to realise that identified value. The diagram below shows how the cost of change rises dramatically in the execute/operate phases.



Through OPREP, Woodside has developed a culture where focus on value adding in the front-end phases is part of day-to-day business. This focus, coupled with a series of value improving practices and assurance checks has enhanced project predictability and ultimately delivery.

Benefits of OPREP

A tangible way to measure the improvement of Woodside’s opportunity & project delivery is to review our IPA Front End Loading results before and after the introduction of OPREP, and the achieved or forecast project results:



As demonstrated by the above chart, the improvement in front-end-loading benchmarking scores has improved by 36% since the introduction of OPREP. Of these post-OPREP projects, the two which were completed, delivered ahead of time and under budget. Of the four projects still in execution, three are forecasting significant cost under-runs and are all on schedule to finish ahead of time. The remaining project is forecasting a 10% cost & small schedule over-run. These results are significantly improved on the pre-OPREP projects.

Way Forward

Although the benefits of OPREP to Woodside are clear from our improved front-end-loading and project delivery, we are now progressing to the next level of improvement. A summary of the activities that are currently being undertaken, particularly in the area of project controls, is outlined below:

Governance

Taking the OPREP framework to the next level involves the introduction of an internal 'Governance across Projects' forum. With Woodside's portfolio expanding across many different ventures this forum demonstrates to the board that the projects are being consistently executed and facilitates information sharing on a regular basis – not just via lessons learned.

Minimum Standards

As part of OPREP, corporate Cost Engineering and Planning guidelines exist. These are high-level documents which provide a framework for project controls. The next step currently being taken is to define minimum standards for systems and reporting which will apply to all projects. This document will form a base procedure for all projects to model their project controls. It will not go so far as always to specify required systems as when utilising EPC arrangements sub-contractor systems may differ.

Training & Development

An activity on the radar screen is the development of our own in-house estimating, cost & planning training programs. These would be based on the above-mentioned minimum standards and would be tailored for our business, using our language. All courses would be written and presented by Woodside personnel. This is seen as a more appropriate way to invest training funds, rather than generic courses run by consultants. The training would include Woodside examples of good and not so good project controls experiences and would assist with the transfer of knowledge from the more experienced hands.

A development process established in 2003 is the mentoring of younger project controls personnel. This discipline has been identified as needing more experienced resources to support our expanding portfolio (ref details below on resource management) therefore senior personnel have been encouraged to recruit and develop for the future. This program includes development of resources from our key Alliance partners.

Resource Management

A database has been established to track project resource capability / availability and requirements over the next 5-10 years allowing resource coordination for career planning, development programs and recruitment. The database is maintained by the General Manager Projects who holds functional responsibility for all projects and is reviewed in the monthly project managers' forum. This database includes management positions, project engineers, senior project controls and senior contracts personnel.

Benchmarking

There are two main forms of benchmarking undertaken by projects as part of OPREP: internal Estimate & Schedule Risk Analysis and external Front End Loading and Cost & Schedule Benchmarking. Enhancements to these activities currently under development are outlined below:

Estimate Assurance and Cost & Schedule Risk Analysis

The estimate & schedule risk analysis reviews to date have been undertaken by a central group of risk experts (3 people, cost, schedule and a leader). As the process has become more widely understood the team is now supplemented by project resources (cost & schedule) familiar with the topic of the review, ie onshore development, subsea tie-backs, etc. This is not only developing our resources in the application of risk management. It also assists with knowledge transfer and adds value to the risk review by involving 'battle scarred' resources.

Front End Loading and Cost & Schedule Benchmarking

A review of these processes is currently under-way to ensure that maximum value is achieved for the time and cost invested. A major hurdle to overcome is the appropriate time of the reviews. As discussed previously in the paper, it is difficult to get the balance right between having enough information to conduct the reviews and having time to implement changes after the review.

To assist with benchmarking, Woodside is in the process of compiling its own internal database of cost and schedule information. This will provide local information as source data for project teams to enhance external bench-marks which may be predominantly based on information from other geographical locations.

Control in the Front End

Through the introduction of an OPREP, focus and effort expended in the front end have increased dramatically. The next step in this development is to 'project control' these front-end phases to ensure that the money spent and the time taken are within agreed targets and are proportional to the future value of the project.

To achieve this project control, resources and systems are being progressively introduced to front end teams. This process is challenging as these front-end teams traditionally complete tasks in whatever cost and time is required.

CONCLUSION – DOES THE DISCIPLINE OF PROJECT CONTROLS REALLY ADD VALUE?

In conclusion, I strongly believe that project controls can add value to projects. However, as a discipline, I feel we are at a turning point to take back control of how we manage the delivery of our services. The cycle of issues facing project controls can be broken, each and every one of us can influence the future of project controls in our own companies, and therefore our own industries and eventually across all industries so we may consolidate and strengthen our position as a core project management capability.