



Project Services Pty Ltd

THE EFFECTIVE MANAGEMENT OF TIME ON MEGA PROJECTS

(Why are there so many problems and how to solve them?)

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For more Schedule Management papers see:
<http://www.mosaicprojects.com.au/Planning.html>

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Synopsis

The construction industry's ability to effectively manage time is getting worse. If the Burj Khalifa in Dubai had been built at the same speed as the Empire State Building (completed in 1931) it would have opened two years earlier!

Research by the CIOB has found most complex/mega projects fail to adequately manage time, most finished late and the situation is getting worse over time. The degree of failure seems to be similar regardless of the size of the penalties imposed for late completion and regardless of the form of contract used.

In response to this, the CIOB has developed a *Guide to Good Practice in the Management of Time in Complex Projects* which introduces a range of practical ideas to enhance the effective management of time in mega-projects including:

- The difference between project planning and scheduling.
- The concept of 'schedule density'.
- The need for on-going dynamic scheduling to manage time.
- The need to contemporaneously assess the impact of delaying events.

CIOB research has clearly demonstrated time is not money and the effective management of time cannot be achieved by measuring cost performance or imposing cost penalties. This paper will outline the major advances in the practice of project planning and scheduling introduced by the *Guide* and shows how various aspects of the *Guide* have already been used on a range of mega-projects.

Introduction

The construction industry's ability to effectively manage time is getting worse. If the Burj Khalifa in Dubai had been built at the same speed as the Empire State Building (completed in 1931) it would have opened two years earlier and been marketed well ahead of the GFC.

Research by the Chartered Institute of Building (CIOB) undertaken in 2007¹ has found most complex projects failed to adequately manage time, most finished late and the situation was getting worse over time. Interestingly, the degree of failure seems to be the same regardless of the size of the penalties imposed for late completion and regardless of the form of contract used. PPP, Alliance, Partnering, D&C, and traditional forms of contract all experienced similar trends and similar levels of failure.

What the CIOB research did uncover was the significant difference in performance between simple and complex projects and on complex projects, between those using effective time-management compared to those that did not.

In response to this challenge, the CIOB assembled an international team of project planning and scheduling experts (including Patrick Weaver) under the leadership of the then IPP, Keith Pickavance, to implement a three-phase strategy to provide the required standards of performance in effective time control.

¹ CIOB Report: *Managing the Risk of Delayed Completion in the 21st Century*

The first section of this paper will analyse the current situation in respect of the management of time on mega-projects and highlight a number of case studies. The second section will review *The Guide* developed by CIOB and the credentialing framework under development. The conclusion will recommend ways to improve the management of time on mega-projects.

The Current Situation

CIOB research has clearly demonstrated time is not money and the effective management of the use of time cannot be achieved by measuring cost performance, imposing cost penalties or fighting over the consequences of delays that occurred in the past. And, the construction industry's ability to effectively manage time is getting worse.

In reaching these conclusions, the CIOB investigated the actual use of effective 'critical path' scheduling to manage the time risk on construction projects. The research covered over 2000 projects and found that '*very few projects were managed by reference to modern methods of time control*' (defined as a regularly stated and updated CPM schedule) and despite CPM being developed more than 50 years ago, '*less than 20% of the respondents thought that current standards of training and education of project schedulers was satisfactory*'. The full CIOB report and an executive summary may be downloaded from <http://www.ciob.org.uk/resources/research>.

The CIOB research showed most complex projects failed to adequately manage time, and interestingly, the degree of failure seems to be the same regardless of industry sector, the size of the penalties imposed for late completion and regardless of the form of contract used.

What the research did uncover was the significant difference in performance between simple and complex projects and on complex projects, between those using effective time-management compared to those that did not. The research found:

- The outcome on simple projects was not influenced by the use, or non-use of time-management; success and failure rates remained the same.
- The outcome on complex projects was directly influenced by the effective use of time-management processes. The better the use, the better the outcome.

Collaborative Working Agreements and Integrated Supply Teams

CIOB's findings are supported by other research and ideas. Sir John Egan's report 'Rethinking Construction'² built on earlier reports (Latham³) and placed the concept of integrated supply chains firmly on the map. The main purpose of Collaborative Working Agreements and integrated supply teams is to engage the client, design consultants, contractors, sub-contractors, vendors into one team, with incentives to establish a structure to ensure that everyone works together to achieve agreed shared targets. The unified team creates an environment where outstanding results can be achieved and the incentives are developed into a Gain / Pain Share arrangement and the schedule is a central tool in the arrangements. If the project is successful there will be Gain Share, if it is not then there may well be Pain Share.

² Egan J, Rethinking Construction, 1998. Download from: http://www.mosaicprojects.com.au/PDF/rethinking_construction.pdf

³ Constructing the Team (The Latham Report), 1994

Some of the key principles involved include:

- There should be equitable benefit for all parties in the agreement.
- An attitude of openness and trust is required to make collaborative working successful.
- Encourage a team focus on “What is best for the Project”.
- Make sure adequate time is spent at the pre-planning stage.
- Include all of the organisations engaged on the project including sub contractors from as far down the supply chain as possible - they do most of the work!
- Long-term ‘supply team’ agreements eliminate the need to start from scratch on each project.
- Ensure processes exist to resolve technical differences (schedule / cost / scope) – independent experts can be helpful.
- Do not underestimate the cultural shift involved; some form of external facilitation is almost essential (as well as top level management support from all parties).

In the UK contracts such as the NEC Engineering and Construction Contract (ECC)⁴ have been designed to support these initiatives.

The Case Studies

Effective project time management seems to be far more closely aligned with developing the right attitudes, expectations and relationships in and around the project team and with the key stakeholders than with developing complex and detailed ‘contract programs’.

Project #1 – Wembley Stadium



The completed stadium

Australian builder Multiplex won the ‘Guaranteed Maximum Price’ (GMP) contract to design and construct a new, world-class 90,000 seat Wembley football stadium. Work commenced in September, 2002, with completion planned well ahead of the FA Cup Final in May 2006. The stadium was eventually finished just in time for the 2007 FA Cup Final.

⁴ See: www.neccontract.com

Some of the key points include:

- In March 2006 Multiplex announced a loss of £106 million and the work was estimated at one month behind schedule. In the final accounting, Multiplex lost AU\$355 million on the project (£150 million) and is the subject of shareholder litigation in Australia over the adequacy of its disclosure of the loss.
- Wembley National Stadium Limited (WNSL) withheld £38 million from Multiplex as a penalty for the late finish which was less than 10% of the £431 million cost overrun.
- Multiplex issued a £350 million claim against Wembley National Stadium Limited (WNSL), the venue's owner, to cover loss of earnings and were prepared for litigation to last several years, blaming WSNL for many of the project's problems.
- After negotiations, everyone walked away from the disputes accepting their losses and declining to add to their respective financial pain with the additional costs associated with years of expensive litigation.

The confidential nature of the final settlement precludes a proper analysis of the issues in dispute but it is safe to assume both parties believed they faced a significant probability of losing any court action (or certainly did not feel sufficiently confident of success to justify court action). The GMP contract was the real problem, by attempting to contract out of any risk, WNSL ended up paying an additional £431 million whilst Multiplex's shareholders 'donated' another £150 million to the project and the work was completed 18 months late.

The fact Wembley is seen as a success now it is finished is a testament to the construction workers and management who were focused on creating a great national monument despite the pressures, not the system that generated the 'failure'.

Terminal 5, Heathrow



T5 under construction, September 2005

At £4.3 billion, T5 was the biggest construction project underway in Europe during its construction, yet it appeared to run like clockwork, and was completed on schedule and 'on budget'. Its success is

attributed to the commitment made by the client, BAA Limited (BAA), to an entirely different way of working focused on proactive collaboration with its contractors.

Under the unique procurement strategy developed for T5, BAA retained all the financial risks of the project; they also created an incentivisation strategy that rewards 'best practice' suppliers and invested heavily in the 'soft' skills of communication and leadership that made this innovative approach work so well. These two strands of formal contracts and measurements, supported by a strong emphasis on developing relationships were mutually dependent. They both contributed to the process of team building and helped ensure that the ethos of collaboration extended to every link in the supply chain.

An outstanding example of this approach was the construction of the terminal roof. Completed sections of the roof, including the box girders, purlins and cladding were planned to be erected in six 2,000 tonne lifts. To minimise any chance of mishaps, BAA, funded the 'roof team' to conduct a £2.4m 'dummy run' in Yorkshire to see whether the concept was feasible. This trial is credited with saving three months work on the Heathrow site and significant costs. This type of initiative would have been impossible under a GMP Contract similar to the one used at Wembley.

Before starting the project, BAA's management had realised that conventional contracts do not really work because ultimately any major risk falls back on the client, so rather than taking the conventional approach of trying to 'avoid all risk' by passing it on to their contractors, they took the key decision to accept and manage the risks inherent in this massive project directly.

Case Study Conclusions

The success of BAA's approach to the management of the construction phase of Terminal 5 to proactively embrace risk appears to have saved a fortune; unfortunately this did not flow through to British Airways and the opening. In contrast, the attempts by the clients on the Wembley project to avoid 'all risk' by contracting out of any involvement in the project simply did not work. The difference between the projects lays in the clients risk attitudes and importantly their willingness to proactively engage in the delivery of 'their project'.

The Traditional View of Project Controls

The Newtonian / Scientific Management view of the world suggests that understanding a complicated entity can be achieved by taking it to bits and studying the parts⁵. Once understanding has been achieved, and because for every action, there is a predictable and equal reaction, a sufficiently developed schedule model should be capable of accurately predicting the future. When the predictions fail to materialise, more investigation is needed; from a scheduling perspective, this translates to the assumption that accuracy is increased by adding detail.

This foundation then allows the assumption that a well developed schedule can, with proper supervision, control workers' actions. The ultimate expression of these ideas is embedded in the legal view of the contract schedule. A contract schedule is assumed by law to represent the way the contract will be executed by the contractor. Some schedule clauses in contracts actually prohibit the modification of the schedule or make the process of changing the schedule difficult.

Some of the problems with this line of reasoning are bullet pointed below:

- To quote the late Douglas Adams "*I can imagine Newton sitting down and working out his laws of motion and figuring out the way the Universe works and with him, a cat wandering around. The reason we had no idea how cats worked was because, since Newton, we had*

⁵ See ***The Origins of Modern Project Management:***
http://www.mosaicprojects.com.au/Resources_Papers_050.html

proceeded by the very simple principle that essentially, to see how things work, we took them apart. If you try and take a cat apart to see how it works, the first thing you have in your hands is a non-working cat." (Adams, 1998). The way complex entities work cannot be understood by breaking them down into parts. Even at the simplest level, studying a fish cannot explain how a shoal of fish work; at a complex level understanding a project task in isolation will not explain the dynamics of a major project and its team of resources.

- If the future was predictable, there would be no need to lose money during stock market crashes and bookmakers would be extinct. The inherent uncertainty about predicting the future has been understood for at least 300 years! As Leibniz wrote in a letter to Bernoulli in 1703 "Nature has established patterns originating in the return of events, **but only for the most part**" (Bernstein, 1996). In summary, the past is a useful guide to what may happen in the future but there are no guarantees.
- The paradox of knowledge workers! Scientific management produced huge productivity gains through the first part of the 20th century. Its focus was on the worker as a part of the productive machinery of business (exemplified by Henry Ford's production line) and discovering the 'right way' of accomplishing each task to maximise efficiency. These ideas worked well for repetitive manual tasks that typified manufacturing through to the 1960s. Problems with the scientific view of management quickly surfaced as the nature of work changed from making tangible things to creating knowledge (eg, writing software).

Consider the software engineer tasked with developing an algorithm to solve a secure access problem. The primary work is thinking through the problem and creating the idea that will allow its solution. This happens in the engineers mind. Counting outputs is useless, the number of lines of code written do not measure the effectiveness of the solution; the most efficient and elegant solution may have far fewer lines of code than some inefficient clunky solution. Furthermore, the effectiveness (quality) of the solution cannot be fully tested until several other components are developed (by other people) and integrated, potentially requiring changes in our engineer's algorithm. The only person that can actually control the work is the knowledge worker and he/she needs to be continually coordinating his/her work with the work of other knowledge workers in the team. The need for a new paradigm to manage knowledge workers was identified as early as 1954 by Peter Drucker (1954) and expanded upon in his later books.

Even the concept of project controls is a misnomer; a control system must by definition control something! The steering mechanism on your car controls the position and action of the front wheels – turning the steering wheel causes the position of the wheels to change in proportion to the degree of movement on the steering wheel and, in normal circumstances, the direction of travel of the car changes in a predictable way in response to the steering command. Other factors such as excessive speed or slippery road surfaces may cause unexpected effects from the steering change but if you turn the steering wheel on a moving car you can definitely expect a consequence.

Despite conventional wisdom and current naming conventions, none of the so-called project control tools actually control anything. Changing numbers in a cost plan will not influence the movement of money into or out of an organisation's bank account – people writing cheques or processing funds transfers do that. Similarly changing the duration of a scheduled activity has absolutely no effect on the time the work actually takes to perform. The most these project control tools can achieve is to influence the thinking of workers in a way that may change their future actions. Nothing can change what's already happened!

Additionally, from a controls perspective, there is a major difference between time and money. If you do not spend money today, it remains in the organisation's bank account to be spent tomorrow. If you do not use time efficiently today, it is gone forever – time moves from the present to the past at a rate of 60 seconds per minute, every minute of the day and nothing can control this! Consequently, the

value of project schedule is not and never has been as a control tool! The value of a useful schedule created by a skilled scheduler lies in a completely different direction as discussed below.

Some Emerging Views of Projects

Chaos Theory and Complexity⁶

Complexity theory has become a broad platform for the investigation of complex interdisciplinary situations. It developed from and includes the earlier field of study known as chaos theory and can be defined as the study of how order and patterns arise from apparently chaotic systems, and conversely, how complex behaviour and structures emerge from simple underlying rules.

Projects are described as chaordic, a system that blends characteristics of apparent order at the macro level with chaos or uncontrollability at the detail level. Within a chaordic system, responses to stimuli tend to be nonlinear (small changes in the stimuli can cause major changes in the resulting action; and the reverse is also true).

Another phenomenon is called the 'Tipping Point' (Gladwell, 2000) where one small additional stimulus can cause a catastrophic and non-reversible change in the whole system (ie, 'the straw that broke the camel's back').

In summary, complexity theory suggests that in a complex system, the result of an action is not predictable! Despite this lack of predictability, the theory explains self-organising systems (complex dynamical systems that are capable of self-organisation). At the simple level there are shoals of fish and flocks of birds, at a more sophisticated level, groups of people. Self organising systems are built from a set of simple rules, contain feedback loops that can amplify or attenuate the effect of stimuli and are capable of learning from and adapting to their changing environment. In many respects this describes the operation of a project team.

Projects as Temporary Knowledge Organisations (TKOs) & Social Networks⁶

Viewing a project as a temporary knowledge organisation (TKO) moves the focus of project management from the observation of the output of the project (its deliverable) to managing the processes needed to transform inputs received by the project team into the project deliverable(s). This is achieved by the gathering, melding, processing, creating and using of knowledge. The distinguishing factor that separates projects from operational work is not the temporary nature of the 'endeavour' (all endeavours are temporary), but the temporary nature of the project team brought together to execute the project and then dissipated on the completion of the project's deliverables. Operational teams are managed on the assumption they are relatively permanent.

Another view of the project team is as a social network. A social network is a social structure made of nodes (which are generally individuals or organizations) that are joined by some form of relationship. Each network contains a level of 'social capital'. This is the sum of the actual and potential resources embedded within, available through, and/or derived from the network. In the context of this paper, the two key aspects of social capital are the 'know how' required to create and deliver the project outcome and the 'willingness' to exert effort to achieve the project outcome. The amount of 'social capital' within the network is heavily influenced by the strength and effectiveness of the relationships within and between the people in the project team.

⁶ See: ***A Simple View of 'Complexity' in Project Management:***
http://www.mosaicprojects.com.au/Resources_Papers_070.html

From complexity theory, the ‘Complex Responsive Processes of Relating’ (CRPR) emphasises the importance of interactions within relationships. ‘*Organisation is an emergent property of many individual human beings interacting together through their complex responsive processes of relating*’ (Stacey, 2003). They use language in conversations to simultaneously transfer information and ideas, negotiate social status and develop power relationships. Consequently the process of ‘organising’ is the human experience emerging from the interactions between people within a network who are all continual forming intentions, choosing and acting in relation to each other as they go about their daily work together implementing the project.

These three ideas come from different branches of research but seem to reach a common conclusion. The driving force within a project team is the intentions and actions of the people making up the team, working with each other through their personal relationships to create and use the knowledge necessary to make the unique project deliverable. Seen from this perspective the future of the project is under perpetual construction by the movement of the human action itself. The people, their interactions and the emerging organisation are located in a specific context (the organisation’s social network, culture and at a more detailed level, the project team) and are oriented towards creating a desired future (the project outcome) that the group is in the process of continually creating (or working to achieve).

Risk and uncertainty are inherent in this construct – it is impossible to see inside peoples minds to fully understand their intentions and without this information it is impossible to accurately predict the future. However, it is possible to influence people’s thinking through effective communication, and a good leader can motivate and inspire the team’s actions.

The Role of Schedules within the Emerging View of Projects⁷

As soon as the idea of the schedule as an accurate control tool is abandoned, paradoxically, the schedule can become an extremely useful management tool. In the ‘complex world’ of a mega-project the schedule can be used as:

- An effective planning tool to help people engage in conversations focused on optimising future actions;
- As a motivator to inspire the performance of team members;
- As an effective communication tool to coordinate actions and assist proactive collaboration.

To succeed in this role, the schedule needs to be flexible, dynamic, responsive and easy for the team members to understand (ie, both useful and used). And the scheduler needs to be a great communicator, questioner, listener and above all, a team player.

Key Focuses for Schedule Management

In the 21st century, the key focus of effective schedule management should be to assist project managers (and project teams) to deliver successful project outcomes. If the project is a success, there will be little need for the detailed ‘as built’ schedules used in litigation and arbitration.

The major challenge facing scheduling is to convince all of the parties to a project/contract that every schedule is inevitably inaccurate. A critical path schedule is a simplified model that outlines one option for completing the work of the project. But, to quote G. Box ‘*All models are wrong, some are useful!*’ Even with the full cooperation of the project team, activity duration estimating is an educated

⁷ For more on this see: ***Scheduling in the Age of complexity:***
http://www.mosaicprojects.com.au/Resources_Papers_089.html

guess about what might happen in the future⁸ and the CPM construct is a gross simplification of the myriad of possible interactions between scheduled activities⁹. Even the calculation of elapsed task durations, start and finish dates are variable in all but the simplest of schedule networks depends on the scheduling tool used and the preferences of the scheduler.

These inherent characteristics of the CPM modelling process represent a major issue if people around the project expect a precisely accurate statement of the future. They are irrelevant if the same people accept, to paraphrase George Box, *'every schedule is wrong, some are useful'* and they work collaboratively to create a useful project management tool.

Another version of the Box quotation is *"all models are wrong; the practical question is how wrong do they have to be to not be useful?"* Accepting the fact that the schedule cannot be 100% correct does not remove the challenge of making it as realistically accurate as possible. The past is still a guide to the future and whilst committed team members may not deliver on their commitments at some point in the future, the schedule needs to represent the project team's best intentions and expectations 'at this point in time' if it is to be seen to be realistic and achievable. Only after the schedule has crossed this first hurdle and is accepted by the project team as 'realistic and achievable' can it start to be useful. In this regard, the key characteristic of a 'useful schedule' is that it is used by the Project Manager and project team to manage the execution of the project work in a proactive and collaborative way. In short, **useful schedules are 'useful' because they are used!**

Attributes of a 'Good' Schedule – The document¹⁰

Some of the key elements needed to create and maintain a 'good schedule' are:

- **Understanding the purpose of the Project Schedule.** In general terms, the purpose of the project schedule is to provide a useful 'road map' that can be used by the project manager and the project team to assist them in completing the project successfully. However, the sort of schedule that is appropriate for use in the early stages of a major project when its overall feasibility is being established is different from the sort of schedule needed to coordinate the work in a major plant room.
- **Designing the Project Schedule.** Once the purpose of the particular schedule is understood, the scheduler can design an appropriate framework taking into account such factors as the level of detail needed, the update cycle, reporting and communication requirements (these influence coding structures).
- **Developing the scheduling framework.** The critical element in developing a useful schedule is engaging the key members of the project team in the process; the schedule must be 'owned' by the project manager and project team if it is going to be useful.
- **Developing the Baseline schedule.** Transitioning the schedule from the agreed team document to the official project baseline involves two phases. The first is essentially 'housekeeping' where the scheduler checks and validates the schedule is complete, it meets all of the project objectives, is correctly coded, etc. Probably the most important check is to ensure the schedule is dynamic; with all activities properly linked and all unnecessary constraints removed. The second phase is obtaining approvals and sign off on the schedule from all of the appropriate stakeholders.

⁸ See *The Cost of Time - or who's duration is it anyway?*:
http://www.mosaicprojects.com.au/Resources_Papers_009.html

⁹ See *Float - Is It Real?*: http://www.mosaicprojects.com.au/Resources_Papers_043.html

¹⁰ For additional information, see: *A Guide to Scheduling Good Practice*.
<http://www.mosaicprojects.com.au/Planning.html#Roles>

- **Maintaining the schedule.** The process that keeps a project schedule ‘useful’ is the regular statusing and updating of the schedule¹¹ and the management of schedule changes through the project’s change control process.

Some of the major damaging influences that destroy the usefulness of the schedule are:

1. Making a detailed schedule into a contract document. This distorts the schedule as parties manipulate data to political ends.
2. Excessive detail - Schedules should have adequate detail for a collaborative coordinated approach to managing the project. Excessive detail:
 - Hides useful information and slows information flows
 - Prevents the easy testing of ideas by ‘what if’ changes
 - At best shows where people are failing to meet the program (even if it is wrong)
 - Does not improve accuracy
3. Promising the Impossible! Scheduling has been sold as:
 - A control tool – but nothing written on paper will control the future
 - A precise statement of fact - the contract program
 - As having accurately calculated durations
 none of these assertions are true and when the schedule fails to deliver the loss of credibility destroys the useful aspects of a schedule as well as the unrealistic expectations.

A good schedule is easy to use, it contains just enough detail for the coordination of the work in a collaborative environment, it’s dynamic and it’s easy to update and maintain. The key measure of a scheduler’s success in creating a ‘good’ schedule is its regular use by the project manager and project team to assist in their day-to-day decision making. This is best achieved by making sure the schedule reports are simple, clear and concise with the right information being conveyed to the right team members and by the project scheduler being easily accessible to help with communication, interpretation and understanding.

Attributes of an Effective Scheduler – The person¹²

The roles fulfilled by a scheduler change as the project progresses through its life cycle from a concept, to a definite ‘job’, to a ‘work in progress’. The three phases are:

- **Pre-initiation (commitment / feasibility planning).** During this phase information is scarce, the planner works with the project team to ‘paint a time picture’ of the project, to develop a strategy for delivery and gain consensus. Generally the scheduler is the key time management expert and frequently a product expert drawing on previous experience to fill in gaps in the overall project information. This is an artistic and creative role focused on ‘what might be’;
- **Initiation and Planning (execution scheduling).** The scheduler is now in a facilitating role assembling information from the project team (and frequently sub-contractors) to develop the project schedule model and eventually the baseline schedule. The scheduler’s role is to integrate and test the information for logic, common sense and completeness by asking the right questions. The information in the model must be ‘owned’ by the project team, but the scheduler remains totally responsible for the integrity of the scheduling tool and the schedule data;

¹¹ See *Managing for Success - The power of regular updates:*
http://www.mosaicprojects.com.au/Resources_Papers_002.html

¹² For additional information, see: *The Roles and Attributes of a Scheduler.*
<http://www.mosaicprojects.com.au/Planning.html#Roles>

- **Executing and Monitoring & Controlling (performance control).** During the execution of the project the scheduler moves into a support role; maintaining the schedule, testing ‘what-if’ scenarios, optimising change outcomes and advises the project team on performance. The scheduler should be consistently alert to identify changes, variations in scope and trends that may influence project outcomes and advise the project management team of his/her observations, findings and recommendations.

To fulfil the roles outlined above, schedulers need to be proactive and constructively inquisitive, continually seeking to understand, clarify and explain the scope of ‘their project’ and the dynamics of the work flow to the project team they support. They have the courage to ‘paint a time picture’ of the project when details are scarce or almost non-existent and then willingly update and modify their starting point as more information becomes available. As the project team members become more familiar with the project, the scheduler is happy to defer to the team member’s opinions and views, acknowledging it is the project manager and project team who are responsible for delivering the project ‘on schedule’.

Schedulers also need core technical skills including being:

- Good with data;
- Concise and accurate in their work;
- Capable of learning how to use a scheduling software tool

Schedule Initiatives to assist Project Management:

A good scheduler will contribute to a whole range of management initiative to help make a project successful. Working in support of the project manager, the scheduler can/should:

- Facilitate and sustain the project scheduling process to the benefit of the project manager and project team.
- Work as a time budgeter making sure adequate time is allowed for all phases of the project, particularly elements that are regularly underestimated such as testing and commissioning.
- Minimise ‘time risks’ and contribute to the overall risk management/risk mitigation efforts of the project team by understanding the dynamics of the project.
- Optimise costs and minimise waste by balancing and smoothing resource demand, minimising relocations, avoiding call backs, etc.
- Facilitate understanding by effective communication with all of the project stakeholders. This requires concise and effective reports focused on the needs of individual stakeholders that are easily understood and acted upon. Some of the key lines of communication are:
 - Communicating with the project team to develop an agreed schedule;
 - Communicating with project stakeholders to explain the schedule;
 - Communicating with the project management team to adapt the schedule to changing circumstances;
 - Communicating with the project team through the status/update process to maintain momentum on the project.
- Keep a very close watch on the overall momentum of the project. If the overall performance intensity drops, the project will eventually lose time regardless of the progress on the critical path in the last reporting period.
- Understanding the ‘spaces’ – what happens in the gap created by Start-to-Start and Finish-to-Finish lags and make sure they are honoured – most project delays occur in these gaps.
- Assign and manage appropriate levels of access and control to the various schedule levels and the data in the tool (particularly if a web enabled interface to the scheduling software is

available to the team). The tools and reports need to be managed at the project level, the team level and the individual resource level

In short, a 'good' scheduler should be one of the key support people assisting the project manager deliver a successful project outcome. He/she achieves this by continually observing, understanding and advising on the time related aspects of the project by understanding the implications of what's happening 'now' and what's likely to happen in the future.

The CIOB Guide and Credentials

CIOB Strategy

In response to the challenge of developing a mechanism for effectively managing time in complex projects, the CIOB has initiated a three phase approach running over several years.

Phase 1 focuses on the education training and accreditation of project schedulers; it includes:

- The development of a *Guide to Good Practice in the Management of Time in Complex Projects* (the *Guide*). This work has been completed and the *Guide* will be published in Early 2011.
- The production of an educational framework for current and future project schedulers. This work has started and Patrick Weaver is part of the development team
- The accreditation of qualifications in time management.
- The dissemination of the *Guide* to other professions in the industry.

Phase 2 will focus on the promotion of amendments to standard forms of contract to facilitate effective time management. Followed by Phase 3, which will focus on the education, training and accreditation of project planners.

Introduction to The Guide

To develop the *Guide to Good Practice in the Management of Time in Complex Projects* (*The Guide*); CIOB assembled a group of international experts (including Weaver) The team had between them, well over 100 years of experience managing time on major projects world-wide This work has been completed and the *Guide* will be published in early 2011¹³.

The *Guide* has introduced a range of practical ideas to enhance the effective management of time in complex projects, of all type and in all industries (not just construction/engineering)¹⁴. Some of the key concepts include:

- The need for effective planning ahead of scheduling and the different objectives of these two processes.
- The concept of 'schedule density' and the need to schedule at an appropriate level of detail based on the personnel currently working on the project and the contemporary knowledge available to the project team.
- The need for on-going dynamic scheduling to manage time. Traditional contracts set up a fixed schedule that is used for the 'historical reporting of failure'. The *Guide* advocates processes for proactively minimising delays using schedule density.

¹³ For more information on *The Guide* see: http://www.mosaicprojects.com.au/Books.html#CIOB_Guide

¹⁴ Some of the practical ideas from *The Guide* are outlined in the accompanying PowerPoint presentation, see: http://www.mosaicprojects.com.au/PDF_Papers/P126b_Management_of_Time.pdf

- The need to contemporaneously assess the impact of delaying events in real time based on accurate and current schedules to allow effective mitigation.

Introduction to CIOB's Time Management Credentials¹⁵

The Guide describes 'how to' manage time in complex projects. CIOB's credential framework is intended to support a career path for people interested in a career as planners and schedulers. The credentials are currently under design, this information is current as at September 2010. There are 4 levels of credential being planned:

Project Time Management Certificate (PTMC)

PTMC is an examination based credential with no prerequisites (CIOB training courses are optional). The basic knowledge framework to be tested is schedule development and analysis based on a PDM network. The examination will be on-line multiple choice.

Project Time Management Practitioner (PTMP)

PTMP is an assessed credential based on a pass in the PTMC certificate examination and approved scheduling experience. Suggested criteria

- Hold the PTMC
- A minimum of 2 years practicing as a project scheduler
- Demonstrate competence in their work environment
 - appropriate level and spread of experience needed
 - diary against various specified criteria.
 - tested by interview (telephone).
- Case studies (2) to fill gaps in experience
- Means and methods (portfolio).
 - How to gather information and determine rates
 - Methodology ideas
 - Examples of project communication to management
 - How to develop information

Project Time Management Specialist (PTMS)

PTMS is an examined credential. PTMS candidates will be required to hold the PTMP credential, demonstrate appropriate experience and pass 4 modules of advanced scheduling. Suggested criteria

- Hold the PTMP and have a total of 5 years experience as a planner/scheduler, including
- A minimum of 2 years practicing as a senior scheduler / planner* (*Planning Manager / Lead Planner / PMO Manager / Lecturer).
- Takes the lead in the development or planning of work – develops alternatives. Defined area of expertise and demonstrated capability in the area. Breadth and depth of experience – diversity. Matrix of project type project phase and depth of work measured by time spent doing the work. Need to demonstrate either a good spread or a great depth – balance. Demonstrated satisfaction from clients (references)

¹⁵ **Note:** At the time of writing, the final CIOB credential framework has not been determined. The contents of this section represent ideas under discussion.

- Pass in the 4 modules defined below: Each module involves coursework, 2 examinations (or possibly 1) and a project assignments. Advanced standing may be available for certain elements of the modules.
 - PTMS Module 1 – Major Projects and Integration
Technical aspects of planning and scheduling major projects and integration at the organisational level
 - PTMS Module 2 – The Time Management Professional
The general capabilities and knowledge required of a professional TM operating at this level
 - PTMS Module 3 – Assessment and Analysis
Assessing and advising on Risk, Uncertainty, Schedule Quality and Controlling uncertainty
 - PTMS Module 4 - Contracts and Claims
Assessing, mitigating, managing, defending and prosecuting claims

Project Time Management Master (PTMM)

The Expert level requires a minimum of 2 years at the Professional Level plus a contribution to the 'Time Management body of knowledge'. A limited number of exceptional leaders in the scheduling profession may be granted PTMM by acclamation. Suggested criteria:

- Hold the PTMS for a minimum of 2 years
- Hold a senior role in industry, consultancy, or academia (not necessarily 100% TM)
- Has contribution to the TM-BoK; examples could include:
 - Thesis at Master's level or above
 - Refereed journal article expanding the TM knowledge framework
 - A scheduling book
 - 2 or 3 learned articles on non-refereed journals
 - Methodological enhancements used in commercial software

PTMC and PTMP credentials should be released in 2011; followed by PTMS in 2012.

Conclusions and Recommendations

The critical need for the client to be engaged in managing all aspects of its project, including time management has been demonstrated by the case studies and the CIOB research.

CIOB's response has been to initiate the development of improved standards, training and certifications for project schedulers to help develop the skilled professionals needed to improve both the client's and contractor's capabilities to manage 'time'. This initiative should be supported.

Finally, the construction industry needs to recognise the critical difference between cost management and time management and invest appropriately in developing skilled planners and schedulers.

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