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A Brief History Of Project Scheduling

Prepared by

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Introduction

The science of 'scheduling' celebrated its fiftieth anniversary in 2008.

Modern project management evolved as a direct consequence of the need to make effective use of the data generated by the planners and schedulers in an attempt to manage and control the critical path and costs of projects.

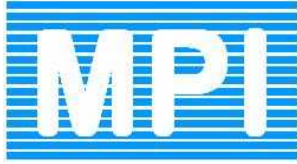
The efficient and timely control of project data only became manageable when mainframe computers were available to the few and project planners and schedulers were regarded as 'professionals' in their own right. Then came the PC's and everyone and no-one was a 'scheduler' in the 1980s and 90s. However, in the 21st century, the new 'enterprise' era sees scheduling once again as a skilled profession, central to the success of projects and therefore business itself.

We have gone back to the future! The challenge now is to find and train enough 'good schedulers' to meet the demand from industry and commerce. And then to provide the career paths and compensation packages that will be seen as an attractive career proposition.

I am very grateful to Raf Dua, General Manager at Micro Planning International Asia Pacific Pty Ltd and to Patrick Weaver, Director at Mosaic Project Services Pty Ltd, both based in Melbourne, Australia for their very kind permission to reproduce this original work.

In The Beginning

In 1956/57 Kelly and Walker started developing the algorithms that became the 'Activity-on-Arrow' scheduling methodology for DuPont. The program they developed



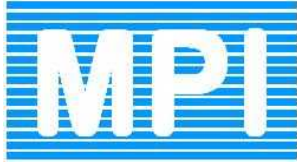
was used in trials on plant shutdowns in 1957 and their first paper on Critical Path Scheduling (CPS) was published in March 1959. The PERT (Project Evaluation and Review Technique) system was developed at around the same time but lagged CPS by 6 to 12 months (although the term 'critical path' was invented by the PERT team). Later Dr. John Fondahl developed the Precedence methodology in 1961 as a 'non-computer' alternative to CPS. Arguably, the evolution of modern project management is a direct consequence of the need to make effective use of the data generated by the schedulers in an attempt to manage and control the critical path.

The evolution of scheduling closely tracked the development of computers. The initial systems were complex mainframe behemoths, typically taking a new scheduler many months to learn to use. These systems migrated to the 'mini computers' of the 1970s and 80s but remained expensive, encouraging the widespread use of manual scheduling techniques, with only the larger (or more sophisticated) organisations being able to afford a central scheduling office and the supporting computer systems.

The advent of the 'micro computer' (i.e., personal computer, or PC) changed scheduling forever. The evolution of PC based scheduling move project controls from an environment where a skilled cadre of schedulers operating expensive systems made sure the scheduling was 'right' (and the organisation 'owned' the data) to a situation where anyone could learn to drive a scheduling software package, schedules became 'islands of data' sitting on peoples' desktops and the overall quality of scheduling plummeted.

Current trends back to 'Enterprise' systems supported by PMOs seem to be redressing the balance and offering the best of both worlds. From the technology perspective, information is managed centrally, but is easily available on anyone's desktop via web enabled and networked systems. From the skills perspective PMOs are re-developing career paths for schedulers and supporting the development of scheduling standards within organisations.

This paper tracks the development of scheduling (with a particular focus on Micro Planner and Primavera) and looks at the way the evolving technology has changed the way projects are scheduled and managed.



The History of Scheduling Tools

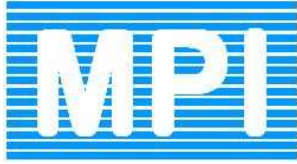
Pre 1956

The concept of 'scheduling' is not new; the pyramids are over 3000 years old, Sun Tzu wrote about scheduling and strategy 2500 years ago from a military perspective, transcontinental railways have been being built for some 200 years, etc. None of these activities could have been accomplished without some form of schedule; i.e., the understanding of activities and sequencing. However, whilst the managers, priests and military leaders controlling the organisations responsible for accomplishing the 'works' must have an appreciation of 'scheduling' (or at least the successful ones would have) there is little evidence of formal processes until the 20th Century.

Karol Adamiecki in Poland developed one of the earliest scheduling tools in 1896. Adamiecki's Harmonygraph has a date scale on the vertical axis (left hand side) and lists Activities across the top. The time phasing and duration of the activities is shown by a 'sliding tab' (essentially the same as a 'bar' in a barchart); of greater significance the Harmonygraph also tabulates each activities predecessors and successors ('from' and 'to') making it a distinct predecessor to the CPM and PERT systems developed some 60 years later.

Henry L. Gantt, an American engineer and social scientist is credited with the developed the barchart (Gantt Chart) in 1917 as a production control tool. In its pure form, the barchart correlates activities and time in a graphical display allowing the timing of work to be determined but not interdependencies. Sequencing is inferred rather than shown and as a 'hand drawn' diagram, the early charts were a static representation of the schedule.

Milestone charts were also in regular use by the 1950s. Major contracts were subdivided into sections with target dates set for accomplishing the work required to achieve each 'milestone'. However, as with Gantt Charts, all of the dates and durations shown in these charts were based on heuristics (rules of thumb) and/or experience. It was possible to identify slippage but any assessment of the impact of a delay was based on a personal view of the data rather than analysis. As a consequence when schedule slippage became apparent on major contracts, the tendency was to flood the work with labour and 'buy time' frequently at a very high premium.



Independent of the development of schedule control processes based on barcharts and milestones, work on linear programming had been going on for a number of years. This branch of mathematics looked at the cause and effect of actions on each other in situations such as the flow of traffic along a freeway. One of the mathematicians involved in this work was James E. Kelley.

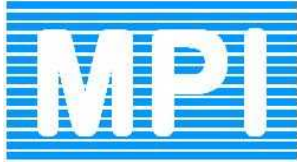
The origin of CPM can be traced back to mid 1956. E.I. du Pont de Numours (Du Pont) was looking for useful things to do with its 'UNIVAC1' computer (this was one of the very first computers installed in a commercial business anywhere and only the third UNIVAC machine built).

Du Pont's management felt that 'planning, estimating and scheduling' seemed like a good use of the computer! Morgan Walker was given the job of discovering if a computer could be programmed to help. Others had started studying the problem, including other researchers within Du Pont but no one had achieved a commercially viable outcome.

In the period from late 1956 through to April 1957, Walker assisted by Kelly and others had scoped a viable project. Their challenge was to solve the time-cost conundrum. They could demonstrate that in preference to flooding a project with labour to recover lost time, focusing effort on the 'right' tasks can reduce time without significantly increasing cost. The problem was identifying the 'right' tasks!

On the 7th May 1957, a meeting in Newark Delaware committed US\$226,400 to a project to develop CPM; Du Pont's share was \$167,700, Remington Rand Univac contributed \$58,700. Univac had decided to help 'to keep IBM at bay'; competition can be useful..... but more important than the money was the people brought to the project by Univac. The Du Pont team was lead by Morgan R. Walker, key players from Univac were James E. Kelley and John Mauchly. Kelley was the mathematician and computer expert nominated by Mauchly to 'solve the problem' for Walker.

The solution adopted by Kelley borrowed from 'linear programming' and used the i-j notation to describe the relationship between activities. This constrained the sequencing and made the calculations feasible (remembering the challenge was still to resolve the 'time-cost' trade off).



This solution created a couple of significant challenges. One was gathering the data needed to load the computer model. Engineers were not used to describing work in terms of activities (tasks) with resource requirements and different costs depending on the resources deployed for a 'normal' duration and a 'crashed' duration. Gathering the data for the first CPM model took Walker over three months.

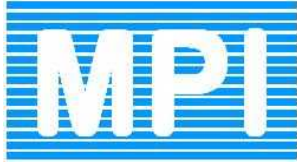
The other problem was that unless you were a mathematician the concept of $i-j$ was virtually meaningless! The 'Activity-on-Arrow' diagram was developed to explain the mathematics to management. Despite all of the problems, by 24th July 1957 the first analysis of the George Fischer Works schedule had been completed and the concept proven. The schedule included 61 activities, 8 timing restraints and 16 dummies.

The major challenge then became reducing the number of calculations and variables to a level that could be processed in a reasonable timeframe. The estimate of the time needed to update a schedule of 150 to 300 arrows was some 350 hours of computer time per month. Some of the challenges were as basic as accessing the right computer; magnetic tapes storing the schedule data were prepared on the DuPont computers and then flown across the USA to be run on machines capable of analysing the data.

Development continued through 1958 and in March 1959 Kelley and Walker jointly presented CPM to the public at large at the Eastern Joint Computer Conference in a paper entitled 'Critical Path Planning and Scheduling'.

As with many innovations though, CPM nearly died as a concept. CPM saved DuPont 25% on their shutdowns, but they dropped the system shortly after the management team responsible for its development changed in 1959. Similarly, RemRand could see little future in the system and abandoned it!

CPM as a technique was 'saved' by Mauchly & Associates (including John Mauchly and Jim Kelley). Starting in 1959, they commercialised CPM, simplified the process to focus on schedule (rather than cost), organised training courses and developed an entire new way of 'doing business'. CPM was popular but expensive – solving scheduling problems (eg loops) could cost the price of a small car! However, the commercial 'push' from Mauchly & Associates moved CPM to the forefront of 'scheduling systems'



(overtaking PERT) until both of the 'Activity-on-Arrow' systems were eventually supplanted by 'Precedence' systems in the 1970s.

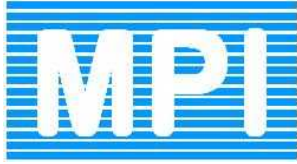
PERT and Associated Systems

PERT was developed by the US Navy Special Projects Office, Bureau of Ordnance (SPO). Apart from introducing uncertainty into schedule durations, the lasting contribution the PERT team have made to the business of scheduling was the invention of the 'critical path'. Kelly and Walker used the name 'main chain' for the longest path through their schedule.

The Navy 'Special Projects Office' (SPO) for the Fleet Ballistic Missile program (Polaris) was created on Nov. 17th 1955 . The 'Plans and Programs Division' of the SPO surveyed the systems used by other organisations used to working on large scale projects during 1956 and a small development team comprising members of the SPO and consulting firm Booz, Allen and Hamilton was established in December 1956 to progress the work. In January 1957, Admiral Raborn, head of the Polaris program, outlined his thoughts on the features of a control system and development work formally began on 27th January 1957, the team quickly described the features of a system including 'a precise knowledge of the sequencing of activities' and 'a careful time estimate for each activity, ideally with a probability estimate of the times the activity might require'.

By July 1957 the first PERT procedures had been published, and by October PERT was being run on computers. Interestingly PERT was not widely used within the Polaris program but was widely publicised and used by Raborn to 'manage his external environment'. This publicity was very successful; first Polaris missile was launched in 1960, by 1964 the PERT bibliography included more than 1000 books and articles!

By 1961, a multitude of PERT like systems had been developed including PERT/Cost, PERT-RAMPS (Resource Allocation & Multi-Project Scheduling), MAPS, SCANS, TOPS, PEP, TRACE, LESS and PAR. These systems were all network based and had distinguishing features of their own. PEP is particularly interesting as it was essentially 'a connected barchart; i.e., a set of bars with links connecting the ends of related bars' . A concept that has re-surfaced in a range of computerised scheduling tools in recent years.



PERT and CPM were remarkably similar, both used the arrow diagramming technique (with arrows representing activities). The fundamental difference was that Du Pont's business was fundamentally known (construction and maintenance of chemical plants) and activity durations could be estimated with some degree of accuracy based on known quantities and production rates. Consequently, CPM was focused on optimising costs by balancing resources. The Navy's work on Polaris was largely R&D with cost a secondary issue; durations could only be assessed and PERT was focused on determining the probability of an event happening by some future date. However, by the late 1960s both CPM and PERT had merged into 'network based management systems'.

UK and European Developments

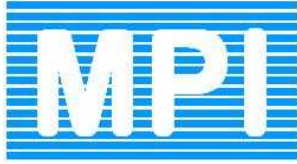
The development of scheduling systems was not exclusively based in the USA. Europeans developed a number of systems although none survived as a dominant tool. By 1968 PERT and CPM had emerged as the standard nomenclatures and dominant systems.

The UK - ICI and CEGB

The British chemical company ICI may have developed a CPM type tool as early as 1955 at its Billingham works. ICI's 'controlled sequence duration' for plant maintenance scheduling used Work Study data to estimate durations and a 'network sequencing', unfortunately, very little information has been found concerning this system.

The Operational Research Section (ORS) of the Central Electricity Generating Board (CEGB) in the UK in the period 1957 to 1958 were involved in developing their version of CPM. ORS-CEGB first came up with the term 'longest irreducible sequence of events' (a bit of a mouthful) which was soon renamed 'the critical path'. By continuing to develop its CPM method and applying it to the shutdown and maintenance of Keadby Power Station in Leicestershire in 1957 the CEGB was able to reduce the shutdown time to 42% of the previous overall average time, and by 1960 to achieve a further 32% reduction. Unfortunately these developments were not widely publicised and seemed to fade into oblivion.

Raf Dua spent almost 32 years with the British Computer Company International Computers Ltd (ICL) [Now Fujitsu], in various parts of the world; where he co-authored



the entire Critical Path & PERT software packages ICL produced from 1958 to 1984.

These were the

- ICT 1300 Series PERT,
- ICT 1500 Series PERT,
- ICT 1900 Series PERT,
- ME29 PERT, 2004 PERT,
- VME PERT being the last one in 1983.

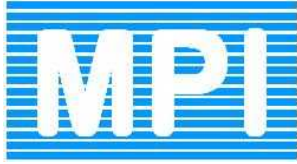
Raf was seconded from BTM (as ICL was in those days) to work with Kelly & Walker (the original authors of the Critical Path technique) in 1956/7 and later with Booz Allen Hamilton (the originators of the PERT technique) on the Fleet Ballistic Weapons Program (Polaris) project for the US Navy in 1958 - 60. (RCA 301 PERT).

Based on the knowledge of ICL's PERT mainframe scheduling system both Raf Dua and Patrick Weaver developed PC systems such as Micro Planner and PlanTrac.

European Tools and Systems

The USSR (Russia) developed its own PERT like system called Setevoe planirovanie i upravlenie. Whilst never significant in the 'West' Russian schedulers have developed other interesting tools, one of the latest being SPIDER Project which dynamically links time, resources and cost (the original Kelley and Walker objective) within a managed risk profile.

The Metra Potential Method (MPM) developed in 1958 by Mr B. Roy, with METRA Consultants of France, may have been influenced by developments in the USA but appears to have been invented independent of the work by Dr. John Fondahl on the Precedence system (Fondahl did not publish his paper until 1961 and was unaware of Roy's work until several years later). MPM employed a graphical system of 'knots' (dots and circles) joined by 'strips'. The 'strips' (lines between the knots) may, or may not have flow direction but did specify the period of time an activity was specified to lag after the start of its preceding activity. The German scheduling tool 'ACOS Plus 1' uses MPM as its underlying scheduling philosophy although from a user's perspective ACOS is similar to most precedence based scheduling tools, however, ACOS does offer a number of additional link types. MPM was probably the first system to use 'lags' in its scheduling algorithms.



Another 'precedence' system developed by Walter and Rainer Schleip, in Munich, in 1960 was called RPS (Regeltechnischen Planning und Steuerung). RPS used a system of blocks, connections and knots (branching or collecting points) to calculate the critical path(s).

The Precedence Diagramming Method (PDM)

In 1961 Dr. John Fondahl published a report entitled 'A Non-computer Approach to Critical Path Methods for the Construction Industry'. This paper described the PDM system of scheduling and was offered as effective manual process to bypass the expensive computer based CPM system.

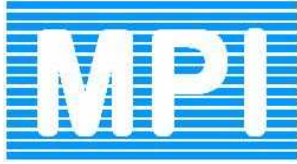
Dr. Fondahl & , as part of a Stanford University team, was commissioned by the US Navy's Bureau of 'Yards & Docks' in 1958 to investigate ways of improving productivity. One key deliverable from this work was his seminal report: 'A Non-computer Approach to Critical Path Scheduling' published in 1961. This report sold over 20,000 copies.

The approach developed by Dr. Fondahl used a 'circle and connecting line' diagram derived from process flow diagrams or flow-charts (both CPM and PERT used the Activity-on-Arrow notation). Some of the key focuses of the 'approach' were:

- The time/cost trade off (the same problem Kelley and Walker were focused on)
- Answering the question 'can a contractors own personnel do CPM without computers'
- The perceived simplicity of the 'flow chart' approach

Notwithstanding the 'non-computer' emphasis in Dr Fondahl's research, his 'friends' in the Texan firm, H.B. Zachry Co. of San Antonio started work in 1962 to implement the system as an IBM Mainframe computer tool (see below) and at least one of Dr Fondahl's students Dick Bryan (Stanford in 1955) worked for, and later became a VP at Zachry .

Work at Stanford continued independent of the Zachery project and included the development of a manual updating process. This report (Technical Report No. 47) was due for publication in 1964 and caused a re-assessment of the name given to the methodology. The then current names for the methodology included 'circle-and-connecting-line', 'operation and interrelation line' (used by one of Fondahl's students for



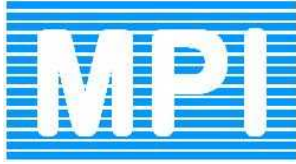
an early computerised version of the methodology), and 'Activity-on-Node' proposed by Moder and Phillips in the first edition of their book 'Project Management with CPM and PERT' published in 1964. However, in early 1964 IBM announced the launch of their 'Project Control System' for the 1440 computer. PCS used the name 'precedence diagramming' and the Stanford team decided to adopt the same name as its usage by IBM would probably prevail.

IBM & H.B. Zachry Company

The transition of Dr. John Fondahl's 'non-computer Approach to Critical Path scheduling' to a computer-based system appears to have been engineered by the Texan construction company, H.B. Zachry Co. of San Antonio. In 1958 Mr. Zachry obtained a new book, Operation Research, and gave it to W.D. Tiner, Jr. (the firm's research director) telling him what he wanted to accomplish in the area of research and methods and asking him to familiarize and train himself in that area so as to utilize those methods in the H.B. Zachry Company. After a through study into methods and prospective costs of the necessary computer equipment, Tiner told Zachry that he did not think the company could afford to spend "that kind of money" on the machines. Zachry's answer was: "Doug, you are wrong, we cannot afford not to spend the money on those machines."

H.B. Zachry Company began experimentation with the critical path method (CPM) of scheduling construction projects in 1959. Some of the early projects to benefit from this initiative included the construction of an Atlas missile base at Abilene, Texas in 1960 using rented time on an IBM 650 and the construction of a facility for Nike Zeus on Kwajalein Island (in the Marshall Islands) in 1961 using an IBM 1620 computer installed in the H.B. Zachry Co offices .

Recognizing the advantages as well as the shortcomings of CPM after actual use of the technique, the Research Division directed its efforts toward exploration of new methods and applications of network scheduling. In 1962, this research culminated in the development of a new CPM, based on the work of Dr. Fondahl, called the 'precedence' or 'sequence' method. Shortly thereafter in March 1963, Zachry Company and IBM entered a joint venture agreement to develop and implement this system for project scheduling. The result of the joint venture was the IBM software program entitled "Project Control System (PCS)". PCS was the first computerised scheduling system to



introduce lags to simplify the overlapping of activities (lags had been included in earlier manual systems but to deal with time/cost issues); interestingly Dr. Fondahl still believes lags should be used carefully and sparingly.

One of the early projects to benefit from these developments was the Devils River Bridge project near Del Rio, Texas (a 5,641ft [1,665 meters] long bridge rising to 223ft [68 meters] maximum height), completed ahead of schedule by H.B. Zachry Co in 1964.

The IBM PCS system and later developments, leveraging off IBM's domination of the mainframe market, eventually made 'precedence diagramming' the dominant mainframe scheduling methodology which in turn flowed through to the 'Mini', 'Micro' and PC applications developed through the 1980s; to the point where by 2004 'precedence' was virtually the only commercially available system in general use for scheduling.

The irony being PDM is now used by every computer based scheduling system, PERT has died out completely and ADM is rarely seen and is generally only found in academic papers where the calculations are performed manually!

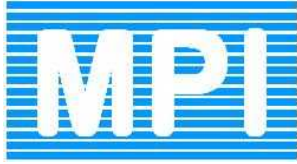
The Impact of the Tools on Professional Schedulers

Mainframe days.

Through to the early 1980s, to create a project schedule you either

- used a mini or mainframe computer system, or
- drew and calculated schedules manually, or
- did both; manual calculations first (to sort out problems) then upload the corrected and checked schedule to the computer; the run-time on the computer cost too much for errors!

Schedulers were trained through a process of apprenticeships and mentoring; it cost too much and took too long to fix problems caused by inexperience! The consequence was the evolution of a group of project schedulers skilled in both the art and science of scheduling. However, as Kelley noted from the very earliest CPM training courses, there was a significant variability in the outcome for scheduling exercises caused by differing skill levels and perceptions on the trainees.



Within organisations, the existence of scheduling departments meant the scheduling processes were standardised and the schedule data was largely 'owned' by the organisation. Additionally, the desire of professional schedulers to exchange information and develop their skills would appear to have been the foundation for the evolution of 'modern project management' .

PC Systems

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Microcomputers emerged in the late 1970s, machines like the Commodore and Atari were initially aimed at the enthusiast. However, by the end of the 1970s microcomputers were starting to make their presence felt in the business world. One of the leaders in the business market at this time was Apple Computer with its first 'commercial PC', the Apple II being launched in 1979. Micro Planning Services in the UK developed the first commercial scheduling software for this class of computer. Running on the Apple II Micro Planner v1.0 was released in 1980 after 14 months development; Micro Planner was based on the ICL PERT mainframe system.

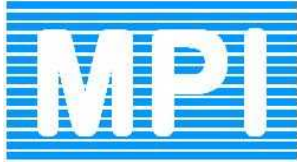
The first IBM PC was launched in 1981; although the definitive IBM XT was not launched until 1983. In 1982, 'The Planner' was released for the 256K IBM PC and the Sirius/Victor.

'Windows' type operating systems became available in 1984 with the launch of the Apple Macintosh, with Microsoft's 'Windows v1.0' being launched in November '85. Micro Planner maintained their association with the Apple system launching graphical scheduling systems for the Apple Macintosh in 1986 and Windows in 1988; followed by the first true GUI scheduling tool Micro Planner X-Pert in 1989 .

Primavera

Primavera was founded in May 1983 by: Dick Faris, Joel Koppelman and Les Seskin (who owned a batch entry mainframe scheduling system).

Focusing on the then 'mainstream' DOS operating system, Primavera shot to prominence with the release of a 10,000 activity capable system in the late 1980s and has since then offered a steady flow of innovative developments.



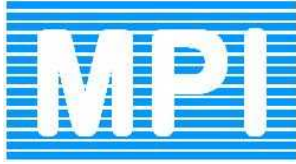
The Changing Industry

During the 1970s, the arrival of powerful project scheduling systems running on 'Mini Computers' caused the first major change. The lower operating cost of systems such as MAPPS on Wang and Artemis on HP and DEC hardware caused the rapid demise of mainframe scheduling systems. Apart from a few legacy systems the era of the mainframe was over by the mid 1980s. The 'mini systems' retained many of the characteristics of the mainframes though and required skilled schedulers to make efficient use of them. From the perspective of the people working as schedulers all that changed was the hardware and maybe the software vendor.

The rapid spread of relatively cheap, easy-to-use' PCs in the latter half of the 1980s spawned dozens (if not hundreds) of PC based scheduling systems including TimeLine and CA Superproject at the 'low end', and Open Plan and Primavera at the 'high end' of PC capability.

The 'low end' tools spread the availability of scheduling systems to a very wide audience and allowed everyone access to cheap computer based scheduling. This had two impacts, by the early 1990s no one was doing manual scheduling (apart maybe from a few 'old timers') and the number of people creating schedules on a part time, untrained basis exploded. At the same time, the increasing capability of the 'high end' systems annihilated the significantly more expensive mini systems. Scheduling had become a desktop PC based process and professional schedulers virtually disappeared from the payroll of organisations (the remaining 'professional schedulers' were predominantly 'consultants' of one form or another, particularly 'claims consultants'.

The last of the significant changes in the industry started in latter part of the 1980s and has continued through to the present time. Despite the ever-increasing number of people using PC based scheduling tools; the competition in the market has driven prices down and caused a major consolidation of the industry. For many years, Microsoft Project could be bought for less than \$100 per set. This decimated the 'low end' market. Similarly the cost of developing graphical user interfaces (GUI's) and staying competitive in the features race at the 'high end' caused most of the system developers to move to greener pastures or simply close up shop.



It is only since the start of the 21st century has this trend begun to change. The increase in the sophistication of Microsoft Project and the rise in its base cost to around \$1000 has opened up the market to a number of low cost entry-level tools based primarily on Gantt charts. There has also been an increase in the number of generally available niche systems offering enhanced; risk analysis (eg Pertmaster), time/location and line of balance capabilities (eg DynaProject™ and LinearPlus) and other functionality, that can operate stand alone or use data from and interact with the dominant systems such as Microsoft Project and Primavera.

More significantly, the emergence of 'enterprise' versions of the high end scheduling tools and their supporting 'project management offices' (PMOs) combined with an increased focus on effective corporate governance has re-focused attention on the role of the professional scheduler (see 'back to the future' below).

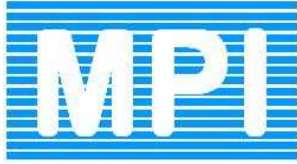
Current Trends - Back to the Future

The Loss of Skills and Control

Prior to the 1980s Scheduling was a serious business; it used very expensive assets, required significant training and skill and was largely centralised and 'visible'. Where manual scheduling was used, the saving in system costs was offset by the tedium of lengthy manual calculations. It simply did not pay to make mistakes! Schedulers were trained professionals.

The arrival of 'easy to use' scheduling tools with a graphical interface radically changed the industry. Scheduling migrated to the desktop and the myth that 'anyone' can schedule (provided they knew how to switch on a PC) emerged. Many people learned 'scheduling' from using tools like Microsoft Project. There was no training or oversight and as a consequence, the average schedule is littered with 'fixes' allowed or encouraged by the tool. The trend has been towards a focus on computer processes and getting a schedule 'looking right' rather than analysing a project to determine the appropriate duration based on appropriate resource availabilities and designing the schedule to be an effective management tool in the context of each specific project.

As a direct consequence of this loss of skills, the importance of scheduling has dropped in most organisations and most projects run late! But the tide is turning.....



Back to the Future

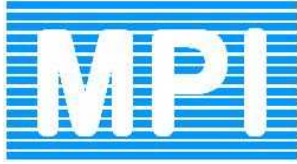
The current requirement for effective 'corporate governance' is focusing management's attention on project controls. The requirement for visibility, predictability and accountability of project performance can only be achieved by the introduction of effective corporate tools supported by skilled project schedulers .

This drive for visibility has been met by the arrival of powerful 'Enterprise' tools such as Primavera Enterprise and the suite of programs from WST including Open Plan and WelcomeHome. These integrated tools with effective data management and security 'built in' are capable of delivering the visibility and control needed for effective corporate governance provided the tools are adequately supported. Additionally, the integrated nature of the tools makes project data visible and this visibility encourages enhanced quality.

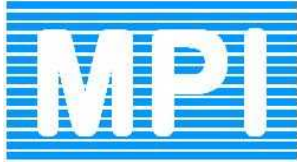
Demand for Skills

However, this drive for quality is creating a worldwide demand for skilled schedulers whilst the training gap of the 1980s and 1990s caused by the PC myth that 'anyone can schedule' has created a shortage of trained schedulers. This skills shortage is being helped by the spread of PMOs and a renewed interest in scheduling training but it will take several years to develop enough trained schedulers with the right mix of skills and personal attributes . Fortunately, many PMOs are starting to recognise the need for, and develop skills in the 'art' of effective scheduling, as well as providing a home and career path for schedulers.

The trend back towards a corporate view of schedule information and the requirement for skilled schedulers to operate the 'enterprise' tools and provide effective assistance to project managers is being supported by the development of new standards. PMI launched its 'Scheduling Practice Standard' in 2006, to augment the information in the PMBOK Guide. A longer-term initiative is the work being undertaken by PMI's College of Scheduling to develop and publish its 'Scheduling Excellence Initiative' . SEI is planned to develop and publish a comprehensive set of industry accepted best practices and guidelines for every aspect of project management 'that touches a schedule, or that a schedule touches'.



The consequence of these trends is that schedulers are once again in great demand around the world. The role of the scheduler is back!



Conclusions

The evolution of scheduling has been a fascinating journey:

- Kelley and Walker set out to solve the time-cost conundrum and invented CPM. For most organisations the resolution of time-cost issues is still in the 'too hard' basket (although SPIDER offers an interesting solution)!
- The PERT project invented the name 'Critical Path', and everyone else borrowed it.
- Dr. John Fondahl invented a non-computer methodology for scheduling that is now used by every computer package worldwide!
- Whilst Kelley and Walkers CPM system that was developed for computers is now primarily seen as a manual technique. The changing role of the scheduler has been almost as interesting:
- The mainframe era saw scheduling as:
 - a skilled profession
 - central to the success of projects
- Then came the PC's everyone and no-one was a 'scheduler' in the 1980s and 90s
- However, in the 21st century, the new 'enterprise' era sees scheduling as:
 - a skilled profession
 - central to the success of projects

We have gone back to the future! The challenge now is to find and train enough 'good schedulers'.



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