



Project Management Advanced Diploma



Computers & PM – Josephine Coffey

Computers & PM – Week 3

- **Overview of Computers & Project Management**
- Guidelines for Procuring PM Software
- Project Management using MS Office applications

Computers & PM - Josephine Coffey

Introduction to Computers & PM

- **Role of Software in PM:**
 - All types of Projects throughout project lifecycle
 - PM software: tools that store, process and output project data
 - Complexity varies – simple calendars to PPM suites
 - Software\Tools developed specifically for PM profession

History of Computers & PM

1900 - 1949

- Pioneers recognised repetitive nature in work. Japanese concept of “kaizen” or continuous improvement.
- Gantt chart introduced by Henry Gantt
- Some early critical path network analysis

1950 - 1969

- PM emerged as a specific discipline
- Mainframe computers can run PM software
- Critical path network analysis exploited

History of Computers & PM

70s

- Workers right
- PM science further developed and professional associations created
- More PM software available

80s

- Personal computers to run PM software
- Precedence network diagrams become the norm
- Much quicker to create and update schedules

History of Computers & PM

90s

- MS Project for Windows released
- Project risk analysis
- Communication & Collaboration
- PM applied to all industries
- Programme and Portfolio Management

History of Computers & PM

2000 +

- MS Project still dominant
- PM Certification and Training
- Web based PM tools
- Agile PM methodology evolving
- Cloud Computing

Project, programme and portfolio

- Definition of project
- Wide choice of tools for single project management
- Related projects managed in Programme
- Mature organisations manage a Portfolio of projects using PPM software
 - Project Portfolio Management (PPM)

Benefits of PM software

- Single app to manage timelines and calendars
- Management of tasks
- Budgeting information
- Team members can access all task lists
- Reports

Benefits of PM software

- Planned vs. Actual
- Single tool to manage and track progress
- “What if” scenarios capability
- Integrated functionality

Downfalls of PM software

- Too Complicated
- Expensive
- Not suitable
- Over reliance by PM

Common features of PM Tools

- [Gantt Charts](#)
- Work or Product Breakdown Structures
- [Critical Path Diagrams](#)
- Resource allocation
- [Organisation Structure](#)
- Cost loading
- [Network diagrams](#)
- Budget Tracking / Cash Flow

Common components of Project Management Tools

- Risk logs
- Issue logs
- 'Baselining'

Software Tools

Stand alone\small projects

- MS Office (~€550 single user, Server €5,500 + €180 per user)
- Project in a box (free)
- OpenProj (free)

Web based

- Clarizen (subscription)
- Basecamp (subscription)
- LiquidPlanner (subscription)
- GanttProject (free)

Software Tools

Portfolio Project Management

- MS Project & Portfolio Management (€1500+)
- Oracle Primavera (€2k)
- HP Project & Portfolio Management
- IBM Rational Project Manager (€2k)
- Project .net (web)

Summary

- Most projects use computers in PM
- Many benefits for Project, Programme and Portfolio management
- The more complex the project the more likely to use specialised PM software
- Huge choice of software available

Computers & Project Management CMI

Part 1: Topic: Overview of Computers in a Project Management context

Overview: To gain an overview of when, how and where Computers are used in Project Management. We will look at some examples of use, some of the products available and will also take a brief look at the history of Computers in Project Management.

Objectives: The student will learn the basics of why and how IT systems / applications are used in the Project Management life cycle. Areas covered are as follows:

- Understanding the basic role of software systems and tools in project management
- A brief history of the use of computers in project management
- Distinguishing between project, programme and portfolio management tools
- The benefits of using Computers in Project Management
- Common components of Project Management Tools
- An introduction to some of the project management tools available today

Introduction

Regardless of the project type or the project stage, a project manager is completely reliant on information to successfully manage and deliver his / her project. This is the case throughout project concept, planning, implementation, completion and closure.

Today, computers and more specifically project management applications or systems are the tools used to store, process and output much of this information. Project management tools vary in complexity from simple calendars to sophisticated project portfolio and programme management suites.

In simple terms, project data should be organised to allow project managers and project teams understand the when, what, who, why and where of their projects.

Software utilities, systems and tools have been developed to specifically service and suit the project management profession. In historical terms, many of the old manual and mathematical functions and features of Project Management have now been computerised and in many cases, integrated into single applications or “suites” of applications. In addition, many specialised utilities have been built to serve high-end, specialised needs such as probability (scheduling and cost) analysis – to gauge the certainty with which a cost or a schedule for a project can be expressed.

A brief history

“Management science” entered the business lexicon in the early 20th century. Pioneers in industry such as Henry Ford and theorists like Frederick Winslow Taylor recognised the repetitive nature of work. This was later refined by the Japanese concept of “kaizen” or continuous improvement. In the same period, Henry Gantt introduced his charts to the world and Gantt Charts remain a standard element of project plans to this day.

Project management only really emerged as a specific discipline in the 1950s. As project management itself advanced in sophistication and in recognition so too did the systems and applications available to support it. It is no coincidence that many project management tools still retain the look and feel of an engineer’s diagrams. Many Project Management professionals were IT and engineering literate and used powerful mainframes to run specially

designed software to assist in the management of highly complex projects. As with many of the IT innovations of the mid-20th century, the U.S. Pentagon was at the forefront - along with some of world's leading corporations such as Du Pont, Motorola and IBM, to mention a few.

The arrival of the personal computer opened up much of the technology previously only available to large corporations. Project management software for desktop computers, such as *Primavera* and *Rational Project Manager*, began to emerge during this time. Most project management applications now tend to be compatible with *Microsoft Windows*, the dominant operating system. This dominance now also extends to project management applications as *MS Project* is the most commonly used tool in the world, with the Gantt chart at the heart of it. The advent of computer networks and file-sharing has allowed these applications to become collaborative tools that can be used in multi-disciplinary, multi-location and culturally diverse organisations.

Project, Programme and Portfolio Management

There are a number of definitions for projects, from the PMI's Project Management Body of Knowledge (PMBOK):

- “a temporary endeavour undertaken to create a unique product, service or result”

And PRINCE2:

- “an unique set of co-ordinated activities, with definite starting and finishing points, undertaken by an individual or team to meet specific objectives within defined time, cost and performance parameters”.

There are many applications available to facilitate the management of individual projects. This does not necessarily mean that everyone should rush out to purchase one of these tools. In many cases, existing Microsoft *Office* applications including *Excel*, *Word* and *Outlook* can get the job done. It can be simply a matter of retaining existing project plans etc. as templates for re-use on similar projects.

Of those applications that are available for the management of individual projects, *MS Project* is the most common. It is reasonably cheap and is relatively easy to use. Other similar applications include *Primavera* and *Project-in-a-Box*, the latter of which provides free downloadable versions.

Projects rarely exist in isolation within an organisation. Projects that are obviously related may be managed in a programme structure. Organisations with a more mature approach to project management will also recognise the existence of a project portfolio and the need for Project Portfolio Management (PPM).

It is in the management of programmes and the application of PPM that the more advanced project management applications come to the fore. These will be referred to as PPM tools. Microsoft has an offering called Enterprise Project Manager which uses information and data fed from multiple MS Project files. Other applications include CA's *Clarity*, IBM's *Rational Project Manager* and *Planview*.

All PPM tools include the functionality required to manage individual projects and then take the information from those individual projects to provide a more holistic view of the overall

projects portfolio or programme. This allows a more complete view of workload for individual resources, budget expenditure, schedule variance, integrated critical path etc. which in turn allows the organisation to plan for shortfalls in advance.

Many PPM tools also provide for the period before a piece of work actually becomes a project – this is generally referred to as “demand management”. An example of a known demand is the notification that legislation relating to the selling of a company’s products is to be changed in the following year. In this example, the company is made aware that there will be changes but is as yet unaware of any detail.

A demand management function within the tool allows the company to factor in the likely need for a project in the next year as early as possible. The addition of further work for the relevant resources can be made early; in this case the Legal Department and Marketing are likely to be involved for instance.

Benefits of Project Management Software

When the correct project management solution has been implemented and staff are appropriately trained to use the software, the likelihood that important deadlines are met and budgets are not exceeded greatly increases, which potentially leads to a greater return on investment. There are several benefits of using project management software including:

- Team members can manage their timelines and calendars in a single application.
- Project managers can easily prioritise tasks, set new tasks and assign tasks to others.
- All budgeting information can be maintained within the application.
- Team members can have access to lists of tasks that have been assigned to themselves and to all other members.
- Reports, such as budget and timeline reports, can be compiled from the data and used to communicate status.
- Assessment of planned vs. actual instantly available on newly delivered items.
- Increased efficiency, productivity, and transparency by giving team members access to a single tool which allows them to manage and track their progress.
- What-if scenario capability can be used to determine the effect of different variables on the project schedule and costs.
- Integrated functionality can offer added control and also increase efficiency.

Of course project management software cannot and will never replace the need for dedicated and experienced project managers.

Possible Downfalls of Project Management Software

While the use of PM software can make the job of a PM much easier, there are also downfalls to be considered especially if the software chosen is not the best fit for the PM and the organisation:

- PM software too complicated.
The software may be far too complicated for the types of projects that are being

undertaken. Too much time can be spent on figuring out the program than on the project itself.

- Too costly.
Purchasing a PM software tool may be costly and the organisation may not see the benefits of a complicated package that requires training and support.
- May not adapt to the culture of the team.
It is important to adapt to the composition of the team and to the work-styles of the team. Contractors may for example have their own method of tracking projects already established.
- Over reliance on the PM software.
It can happen that too much emphasis is placed on the software and the PM becomes over reliant on the tool, losing the personal touch of face to face meetings and the knowledge gained from being on the ground and engaged.

Common components of Project Management Tools

Some of the common components of project management tools are listed below. These will be assessed in more detail in the coming weeks.

- Gantt Charts – calendar layouts in use since early 1900s
- Work or Product Breakdown Structures – task, work package or product specific breakdown of project work
- Critical Path Diagrams – logical start to finish diagrams of the work to be completed
- Resource allocation – resource pools / resource levelling
- Organisation Structure – outline of project teams
- Cost loading – attaching costs to items of work (tasks)
- Network diagrams – logic checking leads and lags in schedule tasks
- Budget Tracking / Cash Flow – expenditure on the project

Risk and Issue logs – often maintained in Excel and / or specialist applications:

- Risk Log – record of all risks identified
- Issue Log – record of all issues identified

Most also support the concept of “baselining”. This is where you agree and approve a plan for costs, schedule, resources etc. and then start the project. As the project is executed, actual costs and progress etc. is compared back against the baseline and differences (+/-) are noted, reviewed and reported on.

Project Management tools available today

The table below shows some of the Project Management software tools available on the market today. The selection includes a representation of tools from all levels of the spectrum – simple individual project management to advanced project portfolio management. Searches on the internet will uncover a vast array of tools and utilities, so organisations must carefully select the appropriate tool for their context.

Many software vendors now offer modular suites of applications for Project Management. Each module integrates to a central or “core” module. This allows you to buy only those components and functions that your business (and project) needs.

Product Name	Level	Brief Description
MS Project	Desktop application for individual projects.	Dominant product, cheap and easy to use. Does have limitations.
MS Enterprise Project Manager	PPM tools using MS Project as the base.	Require hardware, suffers from limitations of MS Project.
Project in a Box	Various levels available from simple projects to advanced PPM.	PRINCE2 focussed, free for less advanced versions.
Primavera	Advanced PPM tool.	Claim to be world leader in area, major player in construction projects.
Clarity (CA)	Advanced PPM tool.	Frequently top of Gartner matrix, marginally ahead of Primavera. Subject to “leap-frog”.
HP Project & Portfolio	Advanced PPM tool.	Another leading product.
Rational Project Manager (IBM)	Advanced PPM tool.	IBM offering, interoperable with Rational suite of products.
Hydra (Project Management Group)	Advanced PPM tool.	UK developed, well used in UK public sector.
Planview	Advanced PPM tool.	Well respected, features on Gartner.
PAT	Advanced PPM tool.	Another PRINCE2 focussed product.
Project.net	PPM tool.	Open-source product.

Conclusion / Summary

We have taken a high level look at the context in which Software is used in Project Management. The key consideration in today’s Project Management world is that very few projects that are undertaken these days, do not make use of Computers to some extent. The more complex a project is, the more likely it is that the sponsoring organisation (and contractors) will use specialist project management software and related IT systems.

Student preparation (informal):

To prepare yourself for the class, try having a look on the Internet for information in the subject area. Searches such as: “Project Portfolio Management Software”; “Project Management Software” will yield a large array of feedback and will provide you with some interesting insights into how broad this area can be.

Further Reading /Reference:

Books / reference:

- Project Management, 9th Edition – Dennis Lock (Gower)
- Guide to the Project Management Body of Knowledge (PMBOK), 5th edition, PMI.
- Managing Successful Projects with PRINCE2, OGC 2005.

Internet:

www.prince-officialsite.com – PRINCE2 website

www.pmi.org – Project Management Institute

www.ipma.ch – International Project Management Association

www.Gartner.com – Gartner website, IT consultancy

www.brighthubpm.com – Bright Hub PM Project Management



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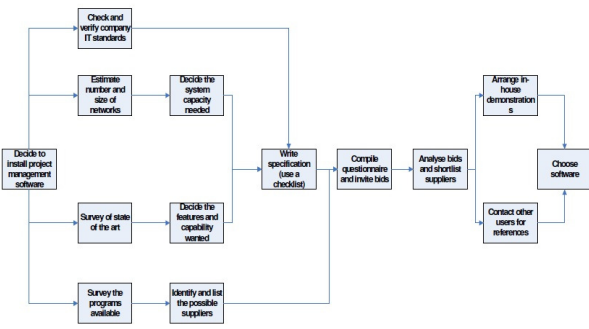
Process for PM software selection

1. Assess existing situation
2. Form selection group
3. Begin research – best practice, industry standards, suppliers / vendors
4. Consider functional & support needs
5. Begin cost-benefit analysis
6. Compile detailed questionnaire – functional & technical
7. Create Long List

Process for PM software selection

8. Create Short List & arrange vendor presentations
 9. Contact other customers
 10. Select preferred vendor
- Project Management, 9th edition (Dennis Lock)
- Lock's Selection Process

Lock's Selection Process



1. Assess existing situation

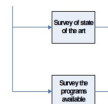
- Compile list of apps already in use
- Consider nature of existing PM organisation
- What are you hoping to achieve?
- Technical constraints
- Budget constraints
- Any criteria that allow existing apps to be discounted?

2. Form Selection Group

- The chairperson (sponsor) e.g. project management office manager
- An IT representative
- Business area specialists (operational)
- PMO staff and some of the organisation's Project Managers
- Group should be clear on objectives of a new tool

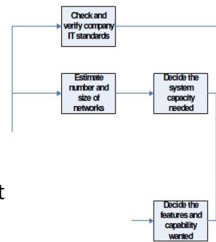
3. Begin research

- Internet search, publications & PM org (PMI, PRINCE2)
- Professional and Personal contacts
- Hire consultant
- Purchase PM Software [RFP](#)
- Keep record of research, contact made with vendors
- Download demos



4. Functional & Support Needs

- Requirements gathering
 - Fact finding
 - Interviews
 - Observation
 - Document & Scenario Analysis
- IT/Operation support requirements
- Capacity Needs? Nr of users, project
- Implementation needs



4. Functional & Support Needs

COTS & Customisation

- “Commercial off the Shelf” packages (COTS), sold-as-seen
- Customisation is process of getting software changes made
- Most solutions involve a combination of both
- Integration with existing systems may be required

5. Begin Cost/Benefit Analysis

- Consider available budget
- Assess benefits:
 - Functional
 - Productivity
- Estimate Costs:
 - buying, customising, installing, operating and maintaining the new system
- No mention of CBA in Lock’s process (Gap?)

6. Compile Detailed Questionnaire

- Specification requirements and minimum capacities
- Questionnaire for purchase of software
- Request for Proposal (RFP)
 - Lists requirements as questions; include technical reqs e.g server types
 - “Weight” given to each item
 - Give Vendor choice of responses to select from e.g. Supported, Unsupported, Enhancement required
 - To be sent to vendors on Long List



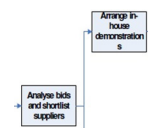
7. Create Long List of Vendors

- Prequalification criteria may be used
- Long list may contain 5-10 vendors
- Cover Letter and Questionnaire (RFP) sent
- Score responses
Weight x Response = Score
- Compare responses & scores



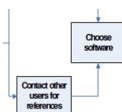
8. Create Short List & Arrange Demos

- Short List may be 3-5 Vendors
- Invite to deliver demos
- The Presentations
 - Provide agenda, sample project and use cases
 - Score Sheet should be used:
summary of questionnaire items plus demo related items
- Each Group member scores Vendor and results compared after demo



9. Contact Other Customers

- Make efforts to discover experience of other companies with the short-listed tools



10. Select Preferred Vendor

- Decision made on “preferred bidder” based on all available information and on completed Score Sheets

Summary

- To justify the cost and get the best fit for your organisation a PM Software Selection Process should be used
- The more detailed and specific to your needs the RFP questionnaire the better the short-list
- Use scoring to rate responses and demo so best Vendor is selected to meet your needs

Computers & Project Management CMI

Part 2: Topic: Guidelines for Procuring Project Management Software

Overview: To look at a procurement process when selecting Project Management Software for your organisation.

Objectives: To review the process of sourcing and selecting Project Management software tools that suits your business needs. Areas covered are as follows:

- Gain a thorough introduction to the process of the selection of a suitable project management tool for your organisation
- Understand Lock's recommended selection process

Introduction

In Part 1, we looked at how important Project Management Software has become in providing scalability, control, integrated functionality, stakeholder collaboration, client insight & reporting etc.

Now we're going to look at how you might go about selecting computerised Project Management software solutions. We'll also take a look at the areas in which separate software solutions can be used and about those that integrate and feed into the core PM system – directly or indirectly. We'll also look at a number of sample files to give you sense of how you might go about selecting PM software.

The focus now is on a suggested selection process for an organisation's project management or project portfolio management tool. This suggested process follows the steps below.

Selecting a PM software solution

The following process outlines a basic approach to selecting any product, system or application to fulfil a business need. Procurement of expensive PM software should ensure that the chosen solution will be able to scale up to the needs of the organisation. The procurement process will always need to adhere to the budget / cost performance appetite of the sponsoring company.

- Assess existing situation
- Form selection group
- Begin research – best practice, industry standards, suppliers / vendors
- Consider functional needs & support needs
- Begin cost-benefit analysis
- Compile detailed questionnaire – functional & technical
- Create Long List (matrix)
- Create Short List & arrange vendor presentations – sample project and weighted
- Contact other customers
- Select preferred vendor

Correct application or tool selection is vital. The right tool can play a major role in not only the successful delivery of objectives in individual projects but also in the management of multiple projects for the achievement of strategic goals. A poor selection can mean that the application adds nothing or that the users become swamped under the weight of a system that is too complicated.

Lock's recommended selection process will also be looked at. Lock's process begins when a decision to acquire a tool has already been made.

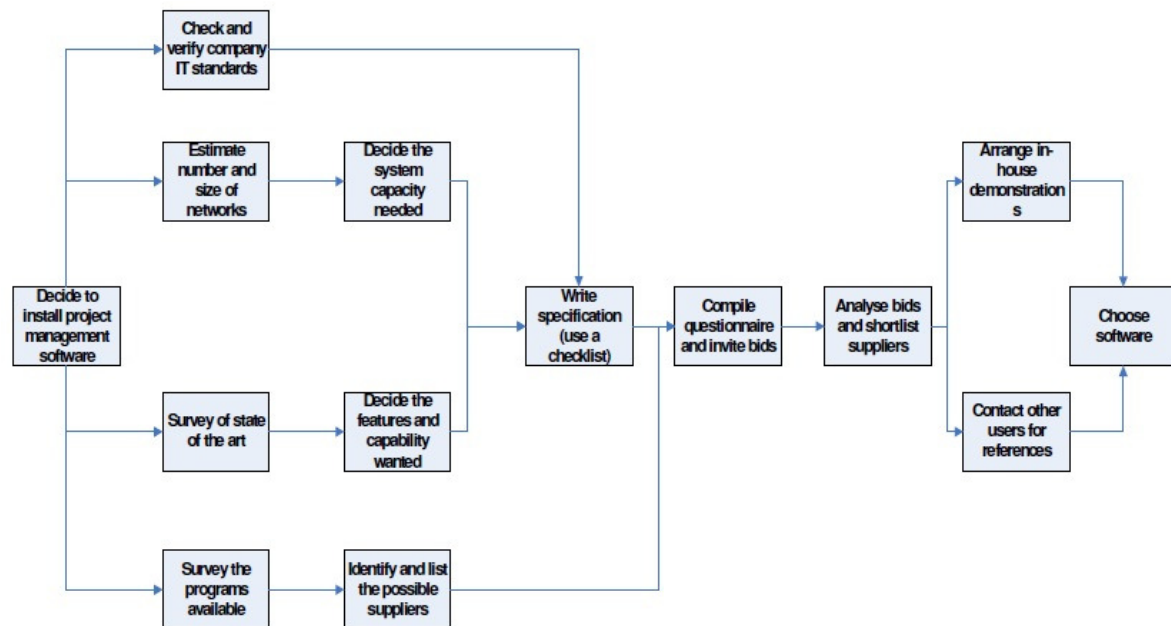


Figure 1 – Lock's Selection Process

To ensure you get the best value and the best functional fit for your organisational needs, you must execute a structured evaluation and selection process.

Existing applications should be taken into account before any decision on even beginning the selection is made. Many of the low-end, non specialised applications can assist the project manager greatly and should be taken into account either before or at least as part of the selection process begins.

Assessing the existing situation

Looking at the existing situation allows you to factor all the positive attributes (things you want the app to have) and the negative attributes (things you don't want the new app to have or that you need it to do better) that they may have. Your previous and current experience of these should inform your decision process when you are looking at selecting your PM software needs.

For example, depending on what you may already be using, you might:

- Compile a brief assessment of any tools or applications already in use (including MS Word etc.).
- Take account of the nature of the PM organisation in your company (e.g. is there a Project Management Office (PMO) or prescribed PM methodology).
- What are you hoping to achieve with the new application?
- What are the technical constraints or limitations in your organisation (e.g. servers and application platforms supported etc.)?
- Budget constraints e.g. a ceiling that Finance will not allow you to exceed,
- Are there any criteria that allow you to discount any of the existing applications and proceed directly to specifying your new system requirements?

If an organisation is at the early stages of introducing formal project management and PM systems, it may be too soon to consider the introduction of new software as well – unless you’ve got people that know how to use it already (e.g. new PMO staff). In some instances a new tool or application could be the catalyst for the adoption of project management principles and practices but these circumstances are rare. The best approach is to know what your needs are and then implement a suitable system – rather than buy a new system and then change your organisation to try and get the most out of it.

Many general use applications provide a very broad range of PM functions and utilities to the project manager. It is important to begin by listing each of the applications in use within the organisation – or at least those that could have an application in the management of projects.

The actual set-up of the organisation in project management terms needs to be determined. This will represent the context within which the new PM system(s) are going to be used:

- Is there a project management office (PMO) or similar centralised function?
- Does the organisation apply a prescribed project management methodology, such as PRINCE2?
- Consider the likely users – level of expertise with computers in general, level of expertise with project management methodology, frequency of use, number of users, familiarity with any existing templates etc.
- Are you in a specialist industry e.g. software/construction/engineering/manufacturing?
 - Do you need to include specialised PM processes with close coupling to your industry?
- Do you need to be able to read PM files from sub-contractors and suppliers?
- How will the organisation use the tool if one is implemented?
- Will the tool be used to help prioritise all projects (scoring)?
- Will it be used for resource allocations (pools) and resource levelling?
- Is the tool only intended to provide more discipline around existing applications?

It is advisable to involve the IT department as early as possible. Any specific technical constraints need to be considered straight away e.g. what server types are available? Lock calls this “Check and verify company IT standards”.

These are some of the items that need to be done / considered before beginning the selection process itself.

Form a selection group

The level of project management maturity within the organisation will probably dictate the members of the ‘selection group’. As with most things involved with the management of projects it is vital that all relevant parties or stakeholders are consulted as early as possible.

The selection group should include the following at a minimum:

- ✓ The chairperson (sponsor) should be the person responsible for the application of project management within the organisation, e.g. project management office manager or his / her boss.
- ✓ An IT representative that understands any standards, constraints or policies that must be adhered to in terms of the application itself and the vendor.

- ✓ Business area specialists (operational) – people that know your business and will be able to advise on how you can use the application to manage change and implementation within the production / operations end of the business.
- ✓ PMO staff and some of the organisation's Project Managers. People that have been managing projects in your company and understand how your processes and existing systems work, when they work, and also when they don't work (perhaps more important!).

It is important that the Group members are clear on what the application or tool could bring to the organisation and how the tool will be used. The Group's frame of reference does not have to be definitive and can be extended during the research phase of the selection process.

Begin research – identify your functional needs

The next stage of the selection process is to carry out some research. In project management tools terms there are many places to begin the search.

As with most research today, a search engine such as *Google* is a good place to start. Most of the leading project management publications and organisations have websites. *Project Management Today* (publication of PMI) periodically contains a comprehensive comparison study of many of the applications in the market place.

Some other possible sources are listed in the bibliography. Use your selection groups professional and personal contacts as well – they will know what your competition and clients etc. are using and this will often allow you to form a sense of what applications will suit your organisation.

Lock recommends a “Survey of state of the art” step in addition to “Survey the programs available”. If your organisation does not have any project management applications in place at the outset then it is important to spend some time assessing the state of play in the field of project management.

If you don't have anyone in-house that can conduct research and develop a set of functional and business process requirements documents, consider employing a consultant to develop these documents for you. They will interview all the stakeholders in your organisation and get a detailed understanding of the “as-is” and “to-be” processes and process flows. A consultant that is a specialist in Project Management systems will also be able to benchmark your requirements against best practice. The end result will be a set of documents and process flows that will be used to inform the development of a more detailed listing functional, operational, financial, implementation and post implementation support questions. These will end up in an RFP or “Request For Proposal” to potential suppliers.

The project management organisations (APM, PMI etc.) can provide material on the latest developments in project management and portfolio project management. You may also be able to purchase a generic PM Software RFP off the web and use this as way of shortening the RFP development process i.e. buy it and then change it to suit your organisational needs.

There is a caveat at this stage also. Project management application vendors are in the business of selling their own products. Many have relationships with project management organisations and more particularly with consultancy firms. Bear this in mind during the selection process.

In any case, it is important to keep a record of all research, including any contact with potential vendors. The number of different products out there can lead to confusion so it is vital to be clear which piece of information relates to which product. A simple matrix is a good way to keep track of the research, including names of products, vendors, any questions asked and answers received. Table 1 provides some potential headings.

No.	Unique Id for product
Ranking	For completion at end
Product Name	
Provider	
Contact Name	
Contact Number	
Contact Email	
Contact Website	
Demo?	Date and time of demo
Software Price	Advertised or initially quoted price
Date of 1st contact	

Table 1 – Research Matrix (sample)

A lot of software vendors allow you to download demo applications that will give you a good sense of the look and feel of their applications. Many will also recognise that they are in competition with other vendors and will offer functionality checklists against these competing products. Use these to inform yourself. Try out the demo's and use them to build your requirements lists in your RFP.

Consider detailed functional & support needs

During the research phase you should start to flesh-out the specific functional needs or requirements you have. Your workflow analysis and process flows etc. should allow you to build these lists and, combined with the details from vendor listings, demos and other contacts etc. you can begin to see what you'd need and what you don't need.

Functional requirements are the “what” or the “to-be” for a system or application. What is the application expected to do? Is the application simply to provide a little structure to the management of individual projects or will the tool be used in facilitating strategic decision-making? The “to be” part allows you to map your desired processes onto the applications you review and see which ones are likely candidates.

Although not a development specification, some of the techniques applied in the software development for “requirements elicitation” can be used at this point (and later on to help complete the questionnaire). These include approaches such as:

- Fact-finding
- Interviews – Background, Objectives, Scope, Constraints, Authority, Resources, Deliverables (BOSCARD)
- Observation
- Document analysis – existing template, existing usage
- Scenario analysis – use cases, task models

Capacity needs also need to be determined here. How many users? How many projects? These are the two most significant questions. The size of the projects (i.e. number of tasks on the project) might also be considered here.

Lock labels these steps “Decide the features and capability wanted” and “Decide the system capacity needed”.

You should also consider the level of IT / operation support within your organisation, such as:

- Backup systems in place; do you need a server or recover from tape which may be slow?
- Is the system critical, maximum amount of downtime?
- Number of servers required, do you need an application server and a database server?
- Who is going to support the system? (In-house, third party or both)

If rapid response and restore support is required for instance, then smaller suppliers can be ruled out straight away unless you have in-house IT skills that can do it for you – or a good 3rd party service provider that’s willing to work with you on the support side.

The scale of any 3rd party involvement in the implementation or introduction of the new application also needs to be identified early. Does the organisation have the resources required to facilitate the implementation or will the vast majority of the work have to be conducted by the supplier? Generally speaking, system vendors for the larger and more complex PM systems will provide an implementation service (for a charge) in which they will offer services such as:

- Project Management Services (they know their own product best – leave them at it...!)
- Data migration pre-prep, normalisation, migration & enrichment
- System parameterisation e.g. to get it to do things the way your “to-be” processes dictate.
- User training / train the trainer etc.
- 30 – 60 day post implementation support

Commercial off the shelf (COTS) and customisation

Many / most applications won’t do exactly what you want them to do. COTS packages are “Commercial off the Shelf” products. These are usually “shrink-wrapped” packages and are often sold-as-seen. This is not recommended and if you opt for a COTS, be sure you understand what you want it to do. Usually, you’ll want to tweak it to get it do work your way. This may mean that you need an element of customisation.

Customisation is the process of getting an approved (and experienced) software vendor to make software changes to the COTS base product to either change the way it operates by default – or add additional functionality that is unique to your organisation. A lot of companies invest developer time in integrations – making new systems talk to old once e.g. getting Primavera costs (budgets and actual) to integrate into the Financial Chart of accounts e.g. on Oracle Financials or SAP R3 etc.

COTS are probably the most popular and cost effective way of implementing major software systems today. You (if well planned and managed) avoid the heartache of developing from scratch and the risk of being another failure statistic! Yet, by buying 80% to 90% of the difficult-to-build functionality in a COTS, that means you only have 10% to 20% left to do. Sometimes you can implement the COTS and half of the customisations up front. You can

prioritise the remainder of the customisations and leave them until your business processes need them. Then, you commission your software developer to develop the additional modifications, test and integrate them into the production application.

Conduct a Cost / Benefit Analysis

As with Lock's model, research and the identification of functional needs and support can and should take place at the same time. This is also a good point to consider the available budget for any purchase.

The benefits, functional and productivity improvements in your organisation attached to the introduction of any tool need to be assessed and understood. Large expenditure should be explored to ensure it delivers benefits to the sponsoring organisation. Those responsible for the decision to spend the money will need to be convinced that they'll get a better return from buying, customising, installing, operating and maintaining the new system than they would if they left the [investment] money in the Bank.

More modest expenditure obviously means less need to convince the powers-that-be to spend. But the risks associated with a botched selection still exist. Poor selection of a project management tool will reflect on the project management office (if one exists) and the standing of "project management" as a discipline within the organisation can suffer. Failing in the implementation of your own toolset is equivalent to a "Turkey voting for Christmas"!

Lock's process does not make any specific reference to costs and cost benefit analysis, **which could be perceived as a gap**. There will always be an internal sales job required to get the backing for a new application and convincing the Finance guru's is often the biggest challenge.

Compile a detailed questionnaire

The tool selection process comes with the assumption that the organisation is going to buy in the application and will not develop one in-house or hire a 3rd party to create a bespoke tool. Hence the introduction of a questionnaire as opposed to a development specification. That said, if you have any customisations and special functionality that you haven't seen in your research, you need to build in questions and see which vendors are willing / capable of meeting your business needs.

Lock does however recommend "Write a specification (use a checklist)". This specification will form the basis of the "Compile questionnaire and invite bids" stage in Lock's process.

The questionnaire is what will be sent to the vendors that make a 'Long List'. Lock provides a detailed suggested questionnaire in his book (Figure 20.2). An alternative is to approach things from a 'user type' point of view, where the requirements for each perceived user-type are included: project team member, project manager, director etc.

In class, we'll look a sample RFP and scoring example. This example will illustrate the areas of information that need to be considered when inviting tenders to supply, implement, customise and support an application.

Again there are techniques available from software development practices, e.g. MoSCoW – must haves, should do, could do, won't do. It is not advisable to make preferences explicit to vendors in the questionnaires but the Selection Group should decide the weight that the

various questions carry beforehand. This discipline should be extended to the handling of vendor presentations also.

Technical requirements should be supplied and vetted by the IT department, e.g. server types available to host application. These must also be included in the questionnaire. Make sure you involve them as early as possible as they can stop the project dead in its tracks if you are trying to implement something they can't or won't support. Many of them still haven't cottoned on to the fact that IT is a business service / enabler – not a business driver!

Keep the questions in the RFP questionnaire as functionality focussed as possible!

Create a long-list of vendors

At this stage of the process, the Selection Group will have a good idea of those vendors that are to be considered. You can use prequalification criteria if you like and this is often preferable. You do this by ensuring that vendors can fulfil basic prerequisites that you have e.g.:

- Must be a modular solution (core PM module) with add-on modules that can be purchased as the PM function grows
- Vendor must have an Irish customer base
- Vendor turnover must be in excess of €3M per annum
- Vendor must have a Tax Clearance Certificate from Revenue
- Must have installed 5 similar scale implementations in <<specialist industry>> e.g. Engineering, Food processing etc. within the last 3 years
- Must have no court judgements or legal cases against it for failed or disputed implementations in the last 3 years
- Etc.

You ask respondents to reply to a questionnaire like this and if they get through, then they get onto your long list (possibly 5 to 7 suppliers).

With a long-list from a pre-qualification process, you know you're dealing with a list of candidate vendors that have track record and look like they can deliver for you. The 'Long List' should be finalised at this point. This is to provide some finality to the broad research phase but the List can of course be re-visited if no vendor fits the bill at the end. These instances are rare however. The number of vendors on the Long List is entirely flexible but between 5 on the low side and 10 on the high side makes most sense. An advantage of prequalification is that you evaluate as few real contenders as possible. That avoids wasting your time and also the time of vendors who really haven't any chance of getting your business.

All Long List vendors should receive your questionnaire. They will need to respond to all questions and then return the responses to you for scoring. You should also attach a covering letter for the RFP competition in which you give the vendor additional instructions on how you need them to respond. This letter might cover areas for services you need them to provide such as:

- Project Management Services (asking for €/hr or fixed price costs)
- Data migration (from our old PM system(s) (€/hr * number of hours)
- Customisation work (asking for €/hr cost for developers)
- Implementation and Configuration support.

- Security and control configuration – user groups & user account setup
- Recommended Hardware and estimated Cost
- Post implementation support
- Annual software license fee
- Annual software support

You may also need to require that they complete and sign a confidentiality agreement.

When you complete the scoring process, you should have a mathematical result that indicates each vendor bid in order of the score outcomes.

Create a short-list and arrange vendor presentations

The Selection Group should convene to assess all completed questionnaires and reduce the Long List to the Short List. Depending on the size of the Long List, the Short List should be limited to 3-5 members. You inform the remainder of the bidders that they have not been shortlisted. In general, it is wisest to advise them that the shortlisted vendors will proceed forwards but that we will retain their bid on file in case none of the shortlisted candidates proves capable of supplying the product and services required.

You inform those on the shortlist that they have been shortlisted and invite them to deliver demos of how they will meet your requirements. Generally, it is an idea to develop “use-cases” in scripts that you provide to the vendors. They then need to include the use cases in their demos to prove that they understand your requirements and can deliver both the core functionality and the special customisations you have highlighted in the use cases.

The Presentations

All vendor presentations should be arranged in a reasonably short timeframe as this makes comparison easier. All vendors should be supplied with the following:

- A fixed agenda, including times supplied beforehand
- A sample project – supplied during the presentation
- Any special use-cases

The Selection Group should prepare before each presentation. A “Score Sheet” should be agreed for use by all members during the presentations. This Score Sheet is basically a summary of the questionnaire plus items relating to the presentation itself.

It should also have a section for scoring the demo itself and the use-cases. An item to allow scorer’s rate the technical competence and level of understanding of requirements by each vendor might also be included. Some suggested Score Sheet headings are provided in Appendix 1. In addition a list of questions that the Group wish to ask should be compiled beforehand. A member of the Group should be given responsibility to ensure that the vendors are subjected to the same set of questions.

Each Group member should complete the “Score Sheet” independently. It is generally more convenient to do all “Score Sheets” after all the vendor presentations are complete. Don’t forget to allow people express whether they like the “feel” of the companies and the body-language, responsiveness and general attitude of the vendors. You’re looking for a “can-do” attitude that is reflected in the demos and use-base proofs.

Contact other customers

If a vendor is unwilling to provide a contact with other clients it is not a good sign. If possible, try to contact customers not referred to by the vendor. It can be difficult to achieve this as peer organisations may not be willing to talk but every effort should be made to discover the experience of other companies with the tools on the Short List.

Lock labels this step “Contact other users for references”.

Select preferred vendor

The Selection Group should make the decision on “preferred bidder” at this stage based on all the available information and with particular emphasis on the completed Score Sheets.

Advise the other vendors that you have selected a preferred bidder and that you are entering contract negotiations and clarifications of a Head of Agreement with them.

Also advise them that you will keep them on file and will be back in touch with them if contract negotiations with the current preferred bidder fail.

Conclusion / Summary

Today we have taken a look at how you might source a suitable Project Management software solution. We went through some sample files to indicate how you might build a business case to cover the investment in the application. We also looked at how you might score the responses from the software vendors so that you try to ensure you pick the vendor solution that best meets your needs.

Appendix 1 – Suggested Score Sheet items

Score No.	Item
S1	Implementation Plan
S2	Ongoing Support
S3	Training
S4	Project Team Member GUI
S5	Project Manager GUI
S6	PMO Dashboard (Portfolio Manager)
S7	Project Executive GUI
S8	Project Document Management
S9	Idea/Request/Demand Management
S10	Portfolio Management
S11	Interoperability

Bibliography and Further Reading

- Project Management, 9th Edition – Dennis Lock (Gower)
- Guide to the Project Management Body of Knowledge (PMBOK), 5th edition, PMI.
- Managing Successful Projects with PRINCE2, OGC 2005.
- Brilliant Project Management – Barker & Cole (Prentice-Hall)

Websites

- www.ogc.gov.uk - PRINCE2 website
- www.pmi.org – Project Management Institute
- www.ipma.org – International Project Management Association
- www.Gartner.com – Gartner website, IT consultancy
- http://www.egovernment.tas.gov.au/_data/assets/pdf_file/0019/78031/Digital_Information_Management_and_Storage_Strategy_Project_Business_Case.pdf - Business Case/Cost Benefit Analysis Sample.
- <http://www.prioritysystem.com/ppmselectionaid.html> - RFP template with scoring

Requirements Engineering

- Requirements Analysis – D. Hay (Prentice-Hall) 2003
- Requirements Engineering: A Good Practice Guide – Sommerville & Sawyer (Wiley) 1997
- Writing Better Requirements – Alexander & Stevens (Addison-Wesley) 2002

Student preparation (informal):

To prepare yourself for the class, try having a look on the Internet for information in the subject area. Searches such as: “Project Management RFP”; “Selecting Project Management Software” will yield a large array of feedback and will provide you with some interesting insights into how broad this area can be.



Project Management Advanced Diploma



Computers & PM – Josephine Coffey

Computers & PM – Week 3

- Overview of Computers & Project Management
- Guidelines for Procuring PM Software
- **Project Management using MS Office applications**

Computers & PM - Josephine Coffey

PM using MS Office Applications

PM Component	MS Application	Description
Business Case / Project Mandate / Project Brief templates	MS Word & MS Excel	Simple reusable templates in Word & Excel. - Excel for the financials - Project Status reports
Risk Logs	MS Excel	- Calculate Inherent Risk, effect of mitigation/control, Residual Risk - Track progress, actions, ownership
Issue Logs	MS Excel	Same as for Risk Log. - Tracking completion/status of risks that become issues
Project Budgets	MS Excel	- Also use vendor estimates (e.g. via RFP responses)

PM using MS Office Applications

PM Component	MS Application	Description
Project Diaries & Resource Schedules	MS Outlook, MS Excel	For recording events/due dates etc., a spreadsheet can suffice. Also: - MS Outlook allows the simple use of a calendar and also the assignment of tasks (with reminders).
WBS	MS Excel, MS Outlook, MS Visio	Tasks/products can be listed in Excel, MS Outlook again for assignment and reminders

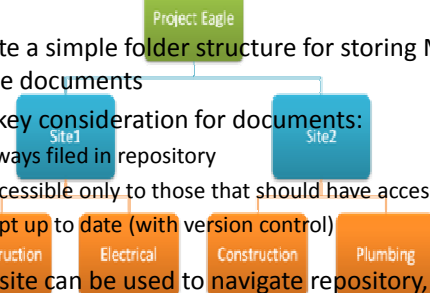
Note: a low cost PM software app may be purchased to use along with MS Office to allow an organisation to learn what it really needs from a PM system.

Level 1: Storage & Location

- **Document repository** - shared, formalised location for the storage or saving of files for a specified purpose
- Consider the organisation's needs:
 - Is Project Integration & Control function required?
 - Are version control procedures required?
 - Organisation's Project/Programme structure

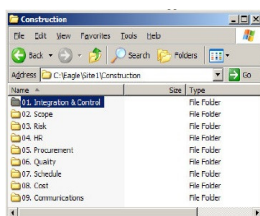
Level 1: Storage & Location

- Create a simple folder structure for storing MS Office documents
- The key consideration for documents:
 - Always filed in repository
 - Accessible only to those that should have access
 - Kept up to date (with version control)
- Website can be used to navigate repository, also Project Intranet used to publish links

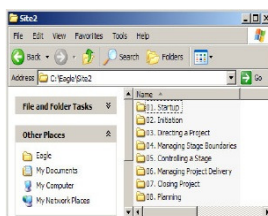


Level 2: Standard folders

Based on PMBOK areas:



Based on PRINCE2 areas:



No difference – you can structure your project share to suit your PM approach, methodology etc

Naming Conventions & Version Control

- Naming convention – files saved in a consistent manner e.g Work breakdown structure for project Eagle...
 - Project Name* - Eagle
 - Sub-project* - Site1
 - Workstream* - Construction
 - File Content* - WBS
 - File type* - XLS (excel)
 - File Name:* - WBS_111023Final_EagleSite1Construction.xls
- Date format YYMMDD – documents sorted by date
- Also Include 'version number' or approval status (Final)
- 'Baseline' maintained using version control

Document Control

- Document Details

Title: Project Plan
 Project: Eagle
 Version: Signed Off
 Date: 23/10/2011
 Author: J. Kelly

- Document Version History / Change Control

Document History			
Version	Author/Reviewer	Date	Comments
V1.0	J. Kelly	23/11/11	Initial version
V1.1	J. Kelly	23/01/12	Added more explanations
V1.2	J. Kelly	30/01/12	Final

Approval History			
Version	Approvers	Date	Comments
V1.2	A. Approver	30/01/12	Signed Off

Security & Protection

Security & Protection

- Network permissions: control access rights
- Track Changes: records alterations to files
- Password Protection: restrict opening/altering documents

More Advanced Doc Repositories

- Including MS SharePoint & Lotus Notes

PM Template Review – MS Office

- [Project Business Case](#)
- [Project Plan](#)
- [Risk Log](#)
- Issue Log
- Project Diaries & Project Schedules

PM Template Review – MS Office

- [Project Budgets](#)
- Project Organisation Structures
- [Work Breakdown Structure](#)
- [Highlight Report & Project Status Report](#)

Summary

- Document Repository created based on organisations needs
- Revision & Approval History specified and maintained
- MS Office templates available for most PM components

Questions

- What are the benefits of using PM software?
- What are the common components of a PM tool?
- Discuss the process required to select a PM software product.
- Discuss the storage of project documentation when specific PM software is not being used?

Computers & Project Management CMI

Part 3: Topic: Project Management using MS Office applications

Overview: This topic will look at how the MS Office software applications can be used to assist in the Project Management process in a commercial environment.

Note: Example files used in class will be uploaded onto Moodle.

Objectives:

- To gain an introduction to and insight into the use of MS Office applications as project management tools.

Introduction

We already looked at how you might source a suitable Project Management software solution. We went through some sample files to indicate how you might build a business case to cover the investment in the application. We also looked at how you might score the responses from the software vendors so that you try to ensure you pick the vendor solution that best meets your needs.

Next, we're going to look at how you can use MS Office applications (other than MS Project) to provide a degree of software based Project Management capability.

Project Management Tool component	MS Application	Description
Business Case / Project Mandate / Project Brief templates	MS Word & MS Excel	Simple reusable templates in Word & Excel. Excel for the financials. - Project Status reports - Schedule / Gantt examples
Risk Logs	MS Excel	Excellent range of possibilities available here. - See sample file - Calculate Inherent Risk, effect of mitigation / control, Residual Risk etc. - Track progress, actions, ownership etc.
Issue Logs	MS Excel	Same as for Risk Log. - Tracking completion / status of risks that become issues
Project Budgets	MS Excel	See sample files provided - Also use vendor estimates (e.g. via RFP responses)
Project Diaries & Resource Schedules	MS Outlook, MS Excel	For recording events / due dates etc., a spreadsheet can suffice. Also, - MS Outlook allows the simple use of a calendar and also the assignment of tasks (with reminders).
WBS	MS Excel, MS Outlook, MS Visio (if available)	Tasks / products can be listed in Excel, MS Outlook again for assignment and reminders.

The MS Office applications we are referring to:

- MS Word – for documents
- MS Excel – for spreadsheets
- MS Outlook – for email, calendar and organiser functions
- MS PowerPoint – for presentations and slideshows

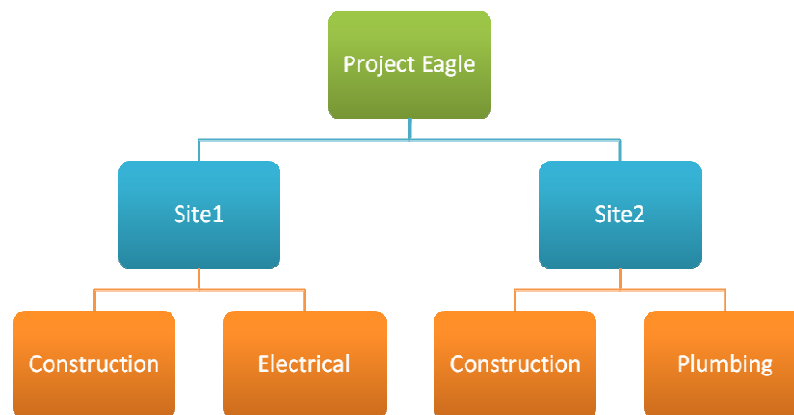
MS Project (this will not be covered in this session)

Level 1: Storage & Location - Documentation Repositories

The most straightforward way to store all MS Office files is to use a simple folder structure in Windows Explorer thereby creating a *document repository*. A document repository means a shared, formalised location for the storage or saving of files for a specified purpose.

Depending on how many people and organisations are involved in the project, you may need to consider the following:

- Need to have a Project Integration & Control function that ensures documents are stored in the right locations and are only accessible to those that need or have permission to access them.
- Need to develop procedural controls to ensure that there is proper version control over key documents. If you don't impose change and version control over key documents, you can lose track of which version is the current one and therefore which one Project Team members should reference.
- You may also want to structure your Project *document repository* along the lines of your project or programme organisation structure e.g.



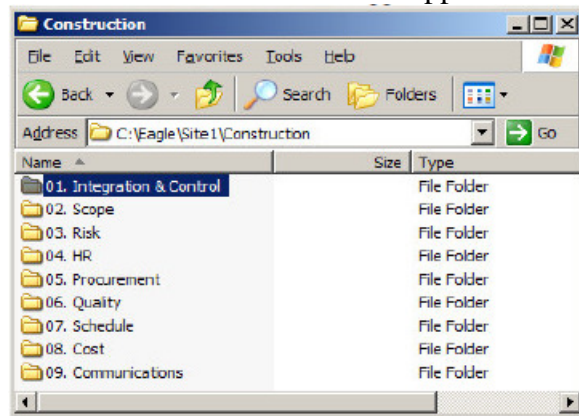
A simple hierarchy can be followed for a project management document repository. The key thing is to ensure that documents that have a home within the repository are filed there, accessible only to those that should have access and that they are kept up to date (with version control).

Level 2: Standard folders – by project:

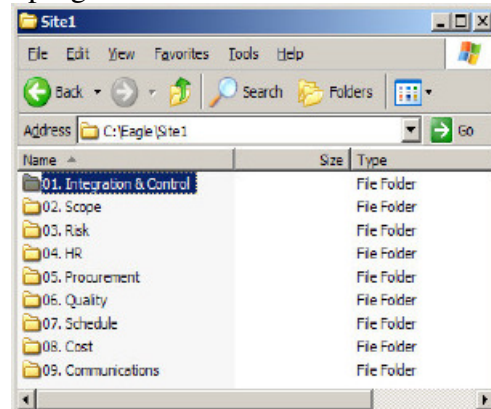
You can set up the folder hierarchy so that it contains all the individual project folders and sub-project folders beneath them. In many cases, it might be on a full network drive (e.g. a project Share) and access controls will be via your group membership i.e. your network user account will be a member of e.g. ProjectEagle\Site1\Construction etc.

Based on PMI Knowledge areas:

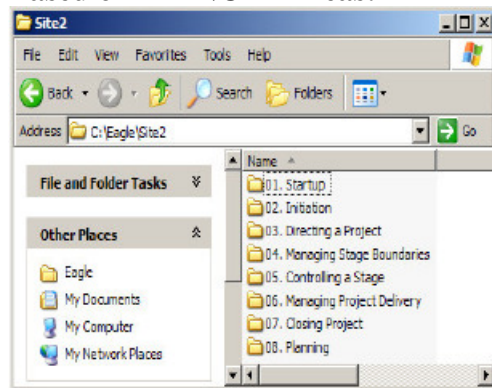
Note: This uses a work-stream approach



Note: This uses one structure for the whole project / programme



Based on PRINCE2 Areas:



What's the difference?

- No difference – the above just shows that you can structure your project share to suit your PM approach, methodology etc.
- Once you build this structure, you need to have someone make sure it's being used properly.
- Don't let people misuse the structure or you'll end up with rubbish in your files and your files won't properly represent what's happening in your project!

The actual set-up of the organisation in project management terms need to be determined so that you can build the fileshare folder structure to reflect the way you want the project team to store and manage data. Another thing you can do is to develop a website to point at all the directories so that your team members will find it easy to navigate to the files and folders they need.

You can also use the website as a Project Intranet to publish notices, document updates, links to the “current” version of files (e.g. Risk Log) etc. Ultimately, this structure will represent the context within which the new PM system(s) are going to be managed and used. It will be influenced by issues such as:

- Is there a project management office or similar centralised function?
- Does the organisation apply a prescribed project management methodology, such as PRINCE2 / PMBOK?
- Consider the likely users – level of expertise with computers in general, level of expertise with the project management methodology, frequency of use, the number of users, familiarity with any existing templates etc.
- Are you in a specialist industry e.g. software / construction / engineering / manufacturing. Name the folders and file so they are meaningful and descriptive.

- Do you need to include specialised PM processes with close coupling to your industry e.g. Statistical Process Controls, CAD/CAM etc?
- Do you need to be able to read PM files from sub-contractors and suppliers?
- How will the organisation use the tool-set when it is implemented?
- Will the tool be used to help prioritise all projects (scoring)?
- Will it be used for resource allocations (pools) and resource levelling?
- Is the tool only intended to provide more discipline around existing applications?

When you take a while to think on the above – one thing becomes clear: you need to know what you’re going to use the tools and utilities for. Remember, there’s no sense in having a “sledgehammer to crack a nut” or, for that matter, “having a nutcracker when you really need a sledgehammer”! You need to have a good understanding of the strength and functionality of the tools you will require.

All of this comes back to the RFP process we reviewed already. You need to understand what your “as-is” processes are and what your “to-be” processes need to be. If you don’t get this right, you’ll end up having the wrong toolset for the road ahead. Be careful when you opt to use MS Office on its own however... You should at the very least purchase an affordable PM software application. If it’s low cost – you haven’t wasted too much time or money and you’ll allow your PM organisation to learn what it is that it really needs from a PM software system.

We previously cautioned you to involve the IT department as early as possible. Any specific technical constraints need to be considered straight away, e.g. what server types does your organisation use? Lock calls this “Check and verify company IT standards”. If they are any good and you can get them on your side, you’ll have a very good ally during your implementation and post implementation support phases.

These are some of the items that need to be done / considered before beginning the selection process itself.

Naming Conventions & Version Control

A naming convention means that each type of file should always be saved in the same manner and location.

For example, when a “Work Breakdown Structure” template is used to describe the Eagle Project, the following naming convention could be applied:

Project Name - Eagle
Sub-project - Site1
Workstream - Construction
File Content - WBS
File type - XLS (if you use excel) .PPT (if you use PowerPoint)
File Name: - WBS_081023Final_EagleSite1Construction.xls

Using the date in format YYMMDD results in the files being “stacked” in age / version order relative to their actual save date. A ‘version number’ is the easiest means to identify the latest version of each document or file. It is also a good idea to include “FINAL” or “SIGNED OFF” in the file name for files that should not be altered during the project.

Document Control

It is vital to the project manager that all alterations or updates to documents or files are easy to identify.

Version control is the first step in control. In addition each document should contain the following:

- Document Details – a simple table outlining the document or file name, the project, version, author, date etc.
- Document History – a simple table recording the updates that were made to each version. This is important as a document version history for anyone who made changes to the document. The ‘Comment’ field should include a brief indication as to why a change was made, e.g. *Amendment to WBS at request of XX in Construction Finance unit, following meeting 20-Oct-11.*

Both the Document Details and the Document History should appear before the contents page of any MS Word document or in a separate sheet in MS Excel (or slide in PowerPoint) – page footers are as hand a place as any. The version that is saved in the document repository is the one that should be used at all times. Try to avoid printing from email attachments etc. as the document may have changed a lot since the email was sent. Once you have the most up to date version on file, generate a link back to it from your project Intranet. If the links are kept up to date, people should never end up using the wrong file.

If a document is checked out for update, consider having the Intranet link point to a file that says “The document you have requested has been checked out for update. Please try again later.”

The examples below show how you might label the front page and the version control table for a document that is under version control:

Document Details

Title: **Project Plan**
Project:
Version:
Date:
Author:

Sample: Document Version History / Change Control

Document History			
Version	Author/Reviewer	Date	Comments

Approval History			
Version	Approvers	Date	Comments

You don't have to version control everything, but documents and files that are important and / or critical to the project approval and communications process should be considered for version and change control.

Approvers are generally a good idea for documents that represent consensus, contractual approval / agreement, stakeholder agreement or project management pronouncements (e.g. policies, procedures, standards etc.).

There are numerous security and protection features available for a document repository of MS Office files.

Some of the more straightforward options are listed here:

- *Network permissions* are the most effective way to control access rights for a document repository. The 'network administrator' controls these rights.
- *Track Changes* (Tools menu) literally records alterations made to a file. Track changes can become overwhelming over a period however so the 'Document History' is a vital component.
- *Password Protection* (Tools / Options / Security) introduce passwords for opening and / or altering documents or folders. This can be extended to individual cells in Excel.

More Advanced Document Repositories

Some of the most common include *MS SharePoint* & *Lotus Notes*. Products such as these advanced document management applications exist provide more automated controls (e.g. automatic notification of changes) for version control and accessibility and also allow for better presentation and search capabilities (when managed properly!).

Business Cases / Project Sanctions / Project Briefs etc.

Every project requires a document that contains the justification and authorisation for the project. This can be easily created in MS Word and can contain some of the following headings (see sample files):

- Reasons – why is the project required? Some commonly used reasons include: strategic, legal or mandatory, cost reduction.
- Options – brief description of the options assessed for the project.
- Benefits – both tangible and intangible
- Risks – summary of the key risks for the project, e.g. resources not available when required.
- Financial Summary – recommended that this is completed in MS Excel and pasted in. Should include estimates of costs including any additional profit & loss impact in the longer term.
- Investment Appraisal – return on investment analysis.
- Project Approach – brief description of how the project will actually be completed

- Sign Off – a key element of most project management documentation. Project managers are powerless without the proper authority so sign-off from the relevant parties should always be documented.

Many organisations apply additional steps here by using a “Project Brief” or “Scope Statement” to further explain how the project will proceed. Ultimately these documents should lead to the first draft of the project plan.

The project plan is a compound document that can include (depending on your methodology) areas such as:

Procurement Plan; Scope / Change Control Plan; Schedule Management Plan; HR / Team Management Plan; Cost Control Plan etc. Naturally, it will also include the design and contract documents that relate to the end product and the efforts involved in delivering it. The Plan should reflect what the project intends to deliver, when it intends to deliver it and how it proposes to do so. It is not unusual for the plan to change if there are major changes e.g. in design (customer changes mind / budget constraints / recession), in external factors (planning permission is always a good one), in critical resource shortages (e.g. cranes not available) etc.

Significant changes should result in a restatement of the project plan, with re-approval and re-issue (on the project file share). The key thing to remember is that if the plan doesn’t properly represent what should be happening, there’s a serious risk the project and product will be adversely affected.

Additional items that are often added in these planning / plan documents include:

- Scope – departments, locations or systems effected. Scope descriptions will vary from industry to industry.
- Constraints – known constraints on project (e.g. head count freeze in project office).
- Dependencies – other departments, organisations or projects that this project depends upon for success.
- Assumptions – make clear what assumptions relating to the project’s success have been made to date.
- Tolerances – reference to the “triple objectives” here: cost, time, quality / scope. What leeway, if any, exists on each of these?
- Name of the project manager and project sponsor or executive.

Project Plans

MS Word is again recommended for the narrative section of the *project plan* documents. There will be many aspects to the plan however, encompassing other MS Office applications.

There should always be a link from the original *business case* or *project charter* through to the detailed *project plan*. The plan is ultimately the detailed version of the original document. For example, if the business case contains a plan to build a single-storey rectangular garage, the plan should include the work, schedule etc. required to complete a single-storey rectangular garage and not a 2-storey octagonal structure.

The latter would require a new business case!

Executive Summary

Project plans can be summary level or extremely detailed. It pays to remember the stakeholders when generating a plan. An “Executive Summary” at the start of a lengthy project plan can be beneficial. Many people are put off by hefty documents and this can slow approval of a plan.

Plan Composition

The project plan should tell the reader:

- What the project is aiming to achieve
- Why it is important to achieve it
- Where it will be carried out
- Who is going to be involved
- How and when is all of the above going to happen
- How much it's going to cost
- Constraints, assumptions, known risks & issues

Baselining

All project plans should be “baselined”. This means retaining the original signed-off version of the plan to allow comparisons and tracking against objectives (cost / time / quality) throughout the project. Version control is important here as the loss of the baseline plan makes comparison impossible!

Project Plan Sections

Most project plans contain the following:

- Background to project – not all readers will be familiar with the circumstances or drivers that lead to the project in the first place. It is important to provide some detail.
- Project definition – objectives, scope, deliverables, exclusions, constraints, interfaces / dependencies, assumptions
- Project approach
- Project tolerances
- Project controls - laying down how control will be exercised over project.

The following sections are generally included and will change or will be updated throughout the project:

- Initial document, e.g. business case with budget
- Project budget
- Project schedule
- Risk log or register
- Project organisation structure
- Roles & responsibilities
- Work breakdown structure or product breakdown structure
- Contingency plans
- Communication plans – who, how and when for reports or updates

The various sections of the plan can be created using other MS Office applications.

Risk Logs / Issue Logs

MS Excel is an excellent application for recording all risks and issues. Individual risks or issues can be assigned individual sheets in an Excel workbook, with one sheet devoted to providing an easy to use summary of all risks or issues associated with the project.

Risk Logs should include all the information about the risks, their analysis, contingencies and latest status.

Some common headings include the following:

- Risk identifier – unique code
- Author
- Date identified
- Description of risk
- Risk category – e.g. legal, technical
- Impact – effect on project
- Probability – likelihood of occurrence
- Proximity – closeness in time risk is likely to occur
- Contingency – countermeasure
- Owner – who will track the risk
- Date of last update – basically another version of ‘Document History’
- Current Status

The Issue Log is there to record things that have actually happened or are about to happen, as opposed to a risk which may or may not occur. No issue is too small to record. The issues can be simply closed out if no further action is required but it always helps to record items that may occur again in the future so that the same solution can be applied.

Common issue log composition items include:

- Project Issue Number
- Issue type
- Author
- Date identified
- Date of last update
- Description
- Priority - a simple scale, e.g. 1 - Low, 5 – Very High can be helpful here
- Status
- Responsible for actioning / managing resolution

Project Diaries & Project Schedules

Simple project diaries can be set-up in Excel including details of personnel locations, milestones (significant point in project) etc. can be added. The diary can be a valuable aid in monitoring progress on the project and also in controlling the work on a day to day basis.

Simple Excel formulae and functions can be used to track expenditure and progress with the Project Diary as the main input. These can also be used to create a Gantt chart. There are templates available to download to greatly simplify this process. Also Excel Add-Ins can be purchased.

See an example below of a Project schedule showing a Gantt chart.

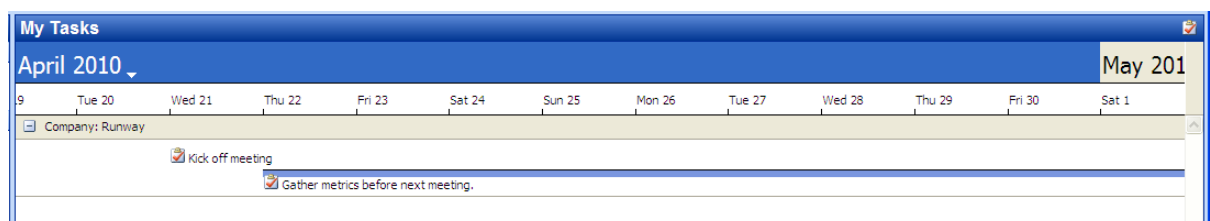
Task	Company	Subject	Owner	Notes	Start Date	Date Due	Date Completed	Status
1	Runway	Kick off meeting	Glen	Start the project off with the team. Location TBD	4/24/2010	4/29/2010	4/29/2010	Completed
2	Runway	Gather metrics before next meeting	Glen	Must have data for analysis by next meeting	4/29/2010	5/6/2010		In Progress
3	Runway	Analysis meeting	Glen	Identify potential root causes	5/6/2010	5/10/2010		

Microsoft Outlook, in addition to Mail, Calendar, and Contacts, has a component called Tasks. There is an option to import the tasks from a project schedule created in Excel into the Tasks section of MS Outlook.

Company	Subject	Due Date	Start Date	Owner	Status	% Complete
Click here to add a new task...						
Company: No Project (1 item)						
No Project	Check my email account	None	None	Glen Youngb...	Not Started	0%
Company: Project Runway (2 items)						
Project Runway	Define meeting	Wed 4/28/2010	Wed 4/28/2010	Glen Youngb...	Not Started	0%
Project Runway	Kick-off meeting	Tue 4/27/2010	Mon 4/26/2010	Glen Youngb...	Completed	100%

We can then assign resources to the tasks and track their progress. When a task is assigned to a resource they receive an email and the task is then added to their MS Outlook task list. From here they can report on the status of the task and receive reminders when tasks are due. Updates to these tasks are then reported back to the Project Manager and appear in their Tasks section.

There is also a Gantt chart view in the Task section of MS Outlook, which looks like this:



This tool can work well in organisations when MS Outlook is the email system used by all members of the project team and is an efficient way for the PM to keep track of tasks, provided the team has received training on how to use the Tasks section of MS Outlook.

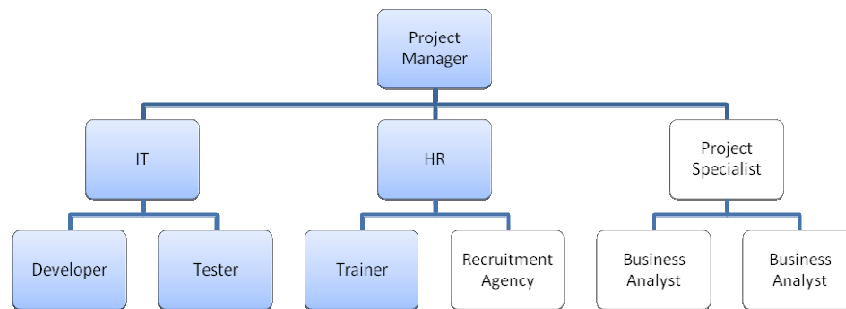
Project Budgets

MS Excel is a spreadsheet application and as such is excellent for the generation of project budgets and in the tracking of expenditure etc. Finance or accounts departments often have required needs and / or applied parameters for budgets within the organisation. Labour costs, fixed costs, expenses etc. can be added to individual sheets and fed to a summary sheet. Using this approach, you can do calculations such as “TaskX” to be completed by “ResourceY” at a cost of €200/day for 5 days = €1,000

Alternatively, some costs can be updated by inputs to the Project Diary e.g. add €250 to labour cost tally for each day “Y” is in attendance.

Project Organisation Structures

MS PowerPoint includes an “org chart” option and this is the best means of sketching out an Organisation Structure for the project. Excel 2007 also has a utility that allows Org Charts (Hierarchy Charts) to be drawn.



Work Breakdown Structures (WBS)

It is possible to use the PowerPoint ‘org chart’ options to provide WBS diagrams but again Excel is generally the best option. A single sheet, feeding to a summary (as per the Risk Log or Issue Log) is again an easy way to gather all the information on each individual task or product that should be completed. The level of detail required for each task or product will vary from organisation to organisation and from project to project.

Some commonly used contents:

- Identifier
- Purpose
- Design or description
- Risks specific to task / product

Highlight Reports & Project Updates

Project stakeholders will require updates and information on project progress from time to time. Many of the suggestions above, in particular the Excel items, can be used to feed into ‘summary’ reports but generally, if MS Office applications are the only ones in use then a narrative will need to be typed up.

Don’t forget that Mail Merge in Microsoft Word can be used to “connect into” an Excel spreadsheet (e.g. costs, schedule, resources, risks, issues etc.). This could be used to generate a standard Status update – or least the numbers part of it – directly from the stats file in Excel. You just open the status report template and refresh the mail-merge data from the Excel Stats file. MS-Mail merge can typically be used to merge with any data source that is MS Office native or ODBC compliant.

The timely and effective communication of project progress to relevant stakeholders is an essential part of controlling a project.

Again MS Word is the best application to use for this work. PRINCE2 recommends the following contents for Highlight Reports but these can be applied in any type of 'update' document:

- Date
- Period covered
- Budget status – use simple RAG (red-amber-green status)
- Schedule status – RAG
- Products / tasks completed during period – RAG optional here
- Actual problems / risks update
- Products / tasks to be completed during next period
- Project issue status
- Budget / schedule impact of any changes
- Tolerance situation

Conclusion / Summary

Today we looked at some ways to structure a document repository and how you can use MS Office applications to provide software based Project Management capability.

Bibliography and Further Reading

- Project Management, 9th Edition – Denis Lock (Gower).
- Risk and Decision Analysis in Projects (2nd Edition) – John Schuyler (PMI).

General reference websites:

www.prince-officialsite.com - PRINCE2 website
www.pmi.org – Project Management Institute
www.ipma.ch – International Project Management Association
www.Gartner.com – Gartner website, IT consultancy
www.theirm.org – The Institute of Risk Management (IRM)
<http://office.microsoft.com/en-us/training/FX100565001033.aspx> - MS Office training

Websites for sample files & other utilities for this week's material:

- www.transcare.com/kaizen/Kaizen_files/Using%20MS%20Office%20to%20Manage%20Projects.pdf - Using Microsoft Office to Manage Projects
- www.egovernment.tas.gov.au/project_management/supporting_resources/templates/small_to_medium_projects - Business Case Template
- www.projectmanagementdocs.com/project-planning-templates/risk-register.html - Risk Log
- <http://office.microsoft.com/en-us/templates/TC011417231033.aspx?ofcresset=1> – Project Status Report
- www.projectconnections.com/knowhow/subsets/sample-templates/StatusReports.doc - Project Status Report (detailed)
- <http://readysset.tigris.org/nonav/templates/plan.html> - Project Plan
- www.vertex42.com/ExcelTemplates/excel-gantt-chart.html - Gantt Chart Template (excel)
- www.ozgrid.com/Services/excel-charting-add-ins.htm - Gantt Chart Add-ins for Excel
- www.criticaltools.com/wbschartprosoftware.htm - Gantt & Pert Chart tools (demo)

Student preparation (informal):

To prepare yourself for the class, try having a look on the Internet for some of the sample files (links) above.

These are easily located using Google searches such as “Project Status Report Template; “Project Plan Template”; “Project Risk Log Template” etc.

Project Management Advanced Diploma



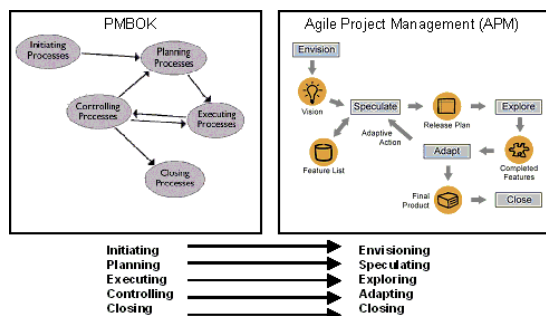
Computers & PM – Josephine Coffey
AGILE

Computers & PM – Agile

- Waterfall – traditional sw development methodology, plan driven
- Agile - iterative and incremental process of collaboration among developers and project stakeholders:
 - Scrum, XP, Crystal, ASD, ..

Computers & PM - Josephine Coffey

PMBOK Project Management Process Groups mapped to Agile



Traditional vs. Agile

- Command-and-control vs. self-organizing teams
- Following a plan vs. responding to change
- Emphasis on process & tools vs. individuals & interactions
- Comprehensive documentation vs. working software

Basic Scrum Vocabulary

- **Sprint**-a 30-day focused effort
- **Product Backlog**-a constantly prioritized to-do list.
- **Sprint Backlog**- highest prioritized items from the product backlog
- **Scrum Master**-coach for the product management team and works to ensure the realization of the goals of the sprint
- **Product Owner**- represents the customer, responsible for prioritizing the backlog
- **Scrum Team**-5 to 9 people who self-organize, joint responsibility for the completed tasks

The Scrum Process

- Create a backlog (prioritised)
- Sprint Planning Meeting
- Sprint schedule
- Sprint begins (15-30 days)
- Daily Scrum
- Sprint Review
- Repeat with new list of prioritized [tasks](#)

(<http://www.youtube.com/watch?v=HawdBAGz2fU>)

Role of PM in Agile (APM)

- Removes blocking issues & impediments
- Facilitates and encourages effective and open communication
- Responsible for holding agile meetings
- Chief motivator and mentor role
- Does Not: overrule, direct, assign tasks, make decisions...

Sample Exam Questions Week 6 Topics

- Discuss the purpose of filtering and sorting in project management.
- Discuss how priority rules can help with resource scheduling.
- Discuss the FOUR main groups of data that will need to be entered when using software for the first time for project planning and resource scheduling.

Sample Exam Questions Week 6 Topics

- Describe the basic information that needs to be established at the outset for Calendars in computer scheduling.
- What constraints or restrictions can be imposed using a PM application, on when tasks can be scheduled?
- Discuss the typical data input errors in project management and give examples of each.

Computers & Project Management CMI

Week 6: Topic: Preparing the Computer Schedule

Overview: We'll be looking at how you prepare and load / build the project schedule.

Objectives:

- Look at a procedure for implementing a new PM software
- Gain an understanding of the data required to set-up a project schedule including:
 - Project data (project code, sponsor, project name / title etc.)
 - Calendar information (working days, hours of work, holidays, multi-national etc.)
 - Resource data (resource names, pools, charge rates etc.)
 - Activity records (task descriptions, task lists, sub-tasks, sequencing, tasks, start dates, end dates, precedence etc. etc.)
- To gain an understanding of basic schedule time analysis
- To learn about some of the common data entry errors on project schedules

Introduction

A software selection process was covered in Week 3. We looked at how files for a project could be stored using a suggested “document repository” approach. We also looked at how MS Office applications other than MS Project can be used to assist in the project management process.

This week's focus is on the basic set-up of computer schedules for projects. There are certain common characteristics across all project schedules or plans. The method of entry varies from application to application and from system to system but the need for core data exists for all.

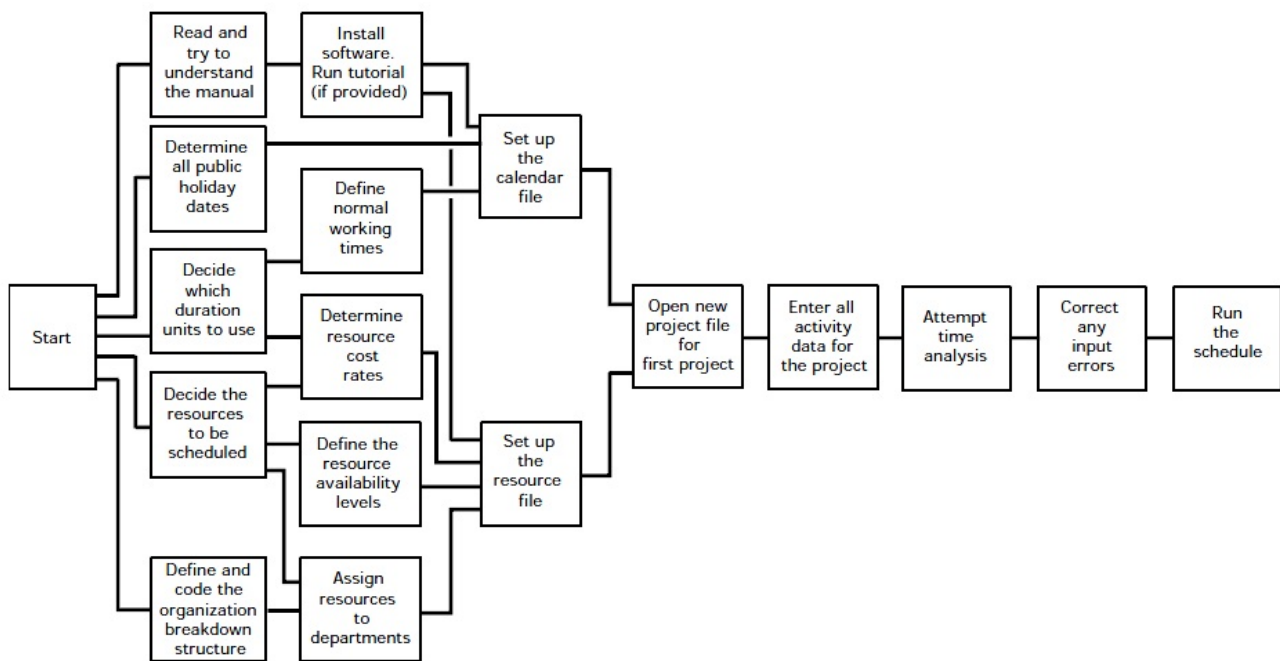
- Project data (describe the project)
- Calendar information (when are resources available)
- Resource data (what resources are available)
- Activity records (when will the resources do / complete the scheduled tasks)

Time Analysis, common data entry errors and the means to identify and avoid them will also be examined.

Implementing a new PM software application:

These are the steps that are typically required when attempting to use new software for the first time for project planning and resource scheduling:

- Install and Setup of software
- Prepare data (project, calendar, resource & activity)
- Open a new project file for first project
- Enter all Activity data for the project – all tasks to be completed, in sequence
- Attempt time analysis – resource levelling, simulations etc.
- Correct any input errors
- Run / execute the schedule



Lock's suggested procedure for implementing new PM software.

New Software Setup

Before we look at building a project schedule there are a few basic things to remember when you start using any new software system:

- Attend a training course from a recognised software trainer for the application software you're going to use.
- If you're going to be an end user, get a copy of the user manual that gets delivered with the application.
- Don't rule out spending a few extra Euro buying books by other authors and publishers.
- Use the help text and on-line tutorials that usually install with the applications.
- Use the templates that software vendors usually bundle with the application software – these are often useful as a basis for developing your organisations own templates as they can often be based on:
 - Industry best practice
 - Software vendors experience
 - Making the most out of the features in the software application
- You can learn a lot about scheduling techniques and how to manage a project schedule from books, websites and other publications that deal with system-independent and system-dependent scheduling.
- Ensure you have sent your techies on technical support training courses.
- Make certain that you receive / source information on how to configure the application in a way that is aligned to how your organisation needs it to operate.
- Consider developing basic, pre-loaded project templates for the different project types that you want your project teams to engage in. For example, you might want templates for:
 - Compliance projects
 - New product development projects
 - Business process change projects
 - Etc.

Once you understand how you want your projects to be run, you basically pre-load these templates with a mandatory set of tasks that all projects in a project category must adhere to. You may allow projects to add to or enhance the template but you would not (procedurally at any rate) allow them to omit any of the template based tasks.

Prepare data

Project data

Project data means the bundle of data that sets up the project file and contains the main details about the project. It is generally descriptive in nature and should generally remain static from the outset of the project until the end.

Project data items include:

- Project name
- Project number
- Project manager name
- Project sponsor
- May include stakeholders and / or work-stream leads etc.

These are items that might also be reflected in the naming convention and folder structure of any document repository and in the ‘sign-off’ tables of project documentation (see Week 3 notes for more details).

Calendar information

This is the information that will facilitate the generation of a calendar or time line for the project. Please note: the second semester includes an entire course on ‘Resource Scheduling’.

Some basic information needs to be established at the outset:

- Working day and week – define the working week, including weekend working and shift work, days of operation
- Holidays – include or exclude public or bank holidays as appropriate.
- Annual leave – or personal holidays should be included for those working on the project.
- Working hours – how long each resource can be scheduled for in a normal working day for that resource type (e.g. a crane may be worked 24hrs/day whereas a bricklayer will be set up for an 8 hour day).

The ‘date format’ to be used on a project is often important, e.g. 01/03/12 means March 1st 2012 to a European but means 3rd January 2012 to an American. It is recommended that an alpha-numeric option is taken, e.g. 01Mar12 to avoid confusion across borders.

As different project team members may work to different patterns it may be necessary to set up a number of overlapping calendars.

Start Date

All projects require a start point or ‘datum point’ that marks the beginning of the project. The start date for the first task or activity is generally used as the project start date.

Resource data

Resource data includes a description of the resource; generally this includes the job title for the human resource and a unique identifier for that resource. Non-human resources need to also be described, e.g. a Building site team needs a tower crane.

The organisation structure and resource listing should reflect the availability and role of the human resources involved. For instance, if a 3rd party provider has been contracted to deliver a specific part of the project, they should appear in the org structure (perhaps within a work-stream). Common examples include programmers, analysis, DBA's etc.

It is also likely that a project manager will not be in a position to schedule resources above a certain managerial level and may need to ensure that senior managers PA's confirm their availability (at least on a provisional basis).

Mandatory Resource Data

The following are recommended for all resources:

- Resource Code – an identifier code, e.g. CDev1 for senior C software developer.
- Resource Name – name as it will appear on reports. It is a matter of preference as to whether or not actual individuals names here.
- Normal availability – the number of resource units normally available to the program for allocation to simultaneous project activities and the period for which the resources will be available (start date & finish date). These available levels may vary during the project.

Sensible planning will take the resources promised and apply a %, such as 75%. This allows for some slippage due to unforeseen events or over optimistic advice. This is part of contingency allocation and will generally be refined as the project task time estimates are firmed up on.

Additional and optional resource data that could also be included:

- Calendar – any special calendar (e.g. alternate shift / night shift calendar) that applies to the resource.
- Cost rate – always a good idea to include cost per schedule unit per resource e.g. per day, per hour, per measured unit (Tons, Cubic Metre, etc.)

Lock also suggests the addition of:

- Threshold resources – additional resources that could be called upon in the event that the existing resources will not be sufficient to meet the project schedule. The most frequently used 'threshold resource' is overtime for existing resources. Temporary staff would also be defined as 'threshold resources'.
- Threshold cost rate – the cost rate for any threshold resource used.

Priority Rules

All projects are subject to the relationship of the triple constraints i.e. time, cost and scope (sometimes referred to as quality). Lock recommends that there are prioritisation rules for project schedules. The key question is should a schedule be time limited or resource limited. Prioritisation of resources is also a consideration.

There will be more detail provided on resource data and resource scheduling in a later topic.

Activity or Task records

Individual tasks or activities should be documented in the project schedule. This can be done using Gantt Charts or Work Breakdown structure functionality or by simple lists (as in MS Excel samples provided). Dependent tasks (precedence dependencies etc.) need to be linked as such in any project schedule.

Mandatory Activity Data

Individual tasks or activities need to have the following included:

- Activity ID number – unique identifier
- ID numbers for immediately preceding or immediately succeeding activities
- Any constraints or dependencies, e.g. does one task have to complete before another later in the project have to begin – tiling before the plumbing for example
- Estimated activity or task duration, using the base unit

Optional Activity Data

The following can also be added for individual activities:

- Activity Description
- Alternative duration estimates – generally referred to as “Optimistic” and “Pessimistic” estimates, used to facilitate PERT or risk analysis calculations.
- Editing & sorting codes – to facilitate reporting it is helpful to provide department or directorate codes for individual tasks. This allows a department manager to have a view on all tasks related to his or her area. Most applications are very flexible in this regard. Simple coding can be easily applied to lists in MS Excel also.
- Resource Data – code or identifier for the resource assigned to the task.
- Cost – estimated or budgeted cost for a particular activity can be applied here.
- Special constraints – it is often possible to set up mandatory links between activities, e.g. code & test, pour concrete & curing time.
- Split-able activities – many tasks can be started, halted and re-commenced at a later date. Lock suggests identifying these types of tasks as early as possible to allow more flexibility later on.
- Don’t forget that most applications support the use of user customisable fields. These can be used to allocate codes and calculations (calculated fields e.g. resource rate * 30% = your profit margin for particular resource) that have special or unique meaning in your PM context.

Open a New Project File

You can generally configure computer based scheduling applications to open with a preferred view – the default view is generally the Gantt Chart. If you prefer another view – many applications allow you to set this so that it loads on start-up e.g. you might start up with a view that shows workflow or work breakdown structures.

Enter Activity data

At the activity planning stage, the work is put into the scheduling tool and organized with predecessor/successor relationships, resources, effort, and duration.

Activity Sequencing

This is the process of identifying and documenting relationships between the project activities. Each task in the schedule, except the first and last, should have at least one predecessor and one successor.

Network diagrams are often used for this process, using a technique such as Precedence Diagramming Method (PDM). Relationships between activities are then identified such as Finish to Start (FS), Finish to Finish (FF), Start to Start (SS) and Start to Finish (SF).

Using this technique it is also possible to identify the critical path and float or slack for each activity.

Target Dates

Often referred to as scheduled dates or milestones, these are the dates in the schedule that need to be highlighted. Most applications also allow the user to impose restrictions or “constraints” on when tasks can be scheduled. Some common examples include:

- An early (‘not before’) date – a good example is a ‘vacate’ date for a construction site.
Start No Earlier Than (SNET) or Finish No Earlier Than (FNET) in MS Project
- A late date – the last possible start date or end date for a particular activity, often called a ‘drop dead date’.
Start No Later Than (SNLT) or Finish No Later Than (FNLT) in MS Project.
- A fixed date – has to happen on or between specific dates, e.g. resource required is in head office for 2 days during a month.
Must Finish On (MFO) or Must Start On (MSO) in MS Project.

These constraints can have different names depending on the software being used such as “Not Earlier Than”, “Not Later Than”, “Must Start Before” etc.

These allow the scheduler to generate relationships and dependencies between tasks in the schedule. For example, you don’t want to order cement before you’ve dug the foundations for your wall. Therefore, the “order cement” task will have a “Must Not Start Before” that is linked to the end date for the “dig foundations” task. This is known as a “Finish to Start” relationship.

Although the above can be imposed using a Project Management Software application this may not be possible, for example if using MS Office applications as discussed in last week 3. In such a case it is still sensible to flag the restricted or required dates in the relevant project documents, e.g. Project Diary.

Time Analysis

Once any basic data errors have been corrected, the software can carry out time analysis on the project. This involves forward and backward passes through the network to determine the amount of float, and the earliest possible and latest permissible times for the start and finish of every activity. Some software such as MS Project will carry out calculations automatically as the network data are entered.

Microsoft Project and *Primavera* both present a table of time analysis results on the left hand side of the same display as a Gantt chart. An example of a full tabular report is shown below with the data required to perform time analysis. Reports can be customised to include other relevant data e.g. cost data, resource requirements, critical status etc.

ID	Task name	Duration	Early start	Early finish	Late start	Late finish	Free slack	Total slack
1	Project start	0 days	10 May '10	10 May '10	10 May '10	10 May '10	0 days	0 days
2	Dig trench and soakaway	2 days	10 May '10	11 May '10	02 Jun '10	03 Jun '10	0 days	17 days
3	Cut roof timbers	1 day	10 May '10	10 May '10	01 Jun '10	01 Jun '10	16 days	16 days
4	Make door frame	1 day	10 May '10	10 May '10	14 May '10	14 May '10	0 days	4 days
5	Dig foundations	4 days	10 May '10	13 May '10	10 May '10	13 May '10	0 days	0 days
6	Make doors	3 days	10 May '10	12 May '10	01 Jun '10	03 Jun '10	0 days	16 days
7	Position door frame	1 day	11 May '10	11 May '10	17 May '10	17 May '10	4 days	4 days
8	Concrete foundations	2 days	14 May '10	17 May '10	14 May '10	17 May '10	0 days	0 days
9	Prime doors	1 day	13 May '10	13 May '10	04 Jun '10	04 Jun '10	12 days	16 days
10	Build brick walls	10 days	18 May '10	31 May '10	18 May '10	31 May '10	0 days	0 days
11	Lay floor base	2 days	18 May '10	19 May '10	02 Jun '10	03 Jun '10	0 days	11 days
12	Fit RSI lintel	1 day	01 Jun '10	01 Jun '10	01 Jun '10	01 Jun '10	0 days	0 days

Time analysis report can be sufficient for planning and managing the project, using the earliest possible dates as the schedule targets.

However in any project where the project activities need people or other resources that are within the project manager's own organization, resource scheduling should always be considered.

Correct Data Entry Errors

Errors will always be made in data entry. Lock makes a few recommendations on locating such errors. Firstly, a sequential list of all activities by activity code providing the previous and succeeding task (as recommended in activity data) can show the user blatant errors.

Error diagnostics is available on many applications that can locate obvious errors in a project schedule. There are 2 categories of data error:

- Identifiable mistakes – an error diagnostic routine should locate these errors, e.g. invalid dates, duplicated activities, dangles, loops
- Unidentifiable mistakes – incorrect durations, incorrect names or resource data. Two things can help here – experience (I did that before – so I won't do it again) and the IT system (if it has been programmed to identify and / or report anomalies etc.)

Identifiable Mistakes

The following mistakes should cause the software to report an error:

- Invalid dates such as February 30th, a date selected that is a non-working day on the calendar, or a date before the Project Start date.
- Duplicate activities are generally not allowed to be entered as the same activity identification number cannot be allocated twice.
- Dangles are activities with no preceding or succeeding activities. These can often be identified by sight on Gantt Charts.
- Loops are caused by incorrect activity links; again these are generally caught at the point of entry.
- Any other issue that the software is designed to report. For example a task with a resource assigned and a duration of zero days.

Unidentifiable Mistakes

Mistakes that the software cannot detect and may lead to errors in the schedule include:

- An incorrect activity duration.
- An incorrect activity name.
- A resource incorrectly assigned or a name mistyped.
- A constraint incorrectly selected.
- Costs missing.

Two things can help here – experience (I did that before – so I won’t do it again) and the IT systems (if it has been programmed to identify and / or report anomalies etc.)

Next Topic

More information on resources resource scheduling and output reports.

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- Brilliant Project Management – Barker & Cole (Prentice-Hall)

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- www.prince-officialsite.com – PRINCE2 website
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- www.ipma.ch – International Project Management Association
- www.projectmanagement9.com – support materials for Lock
- ccfltraining.com/PM-Sequencing_Activities.pdf s - Activity Sequencing

Student preparation (informal):

To prepare yourself for the class, try having a look on the Internet for some of the sample files (links) above. These are easily located using Google searches such as “Project Scheduling”; “Project Scheduling Software”; “Activity Sequencing”; “Building a project schedule” etc.



Project Management Advanced Diploma



Computers & PM – Josephine Coffey

Computers & PM – Week 6

- **Preparing the Computer Schedule**
- Resource Management & Reporting

Computers & PM - Josephine Coffey

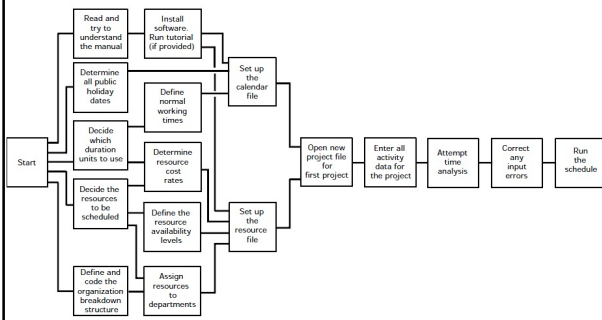
Objectives

- Review steps to implement new PM software
- Understanding of data required to set-up a project schedule :
 - Project, Calendar, Resource & Activity
- Look at basic schedule time analysis

Implementing new PM software

1. Install and Setup software
2. Prepare data
3. Open a new project file for first project
4. Enter all activity data for the project
5. Attempt time analysis
6. Correct errors
7. Run / execute the schedule

Implementing new PM software



Lock's suggested procedure for implementing new PM software

New software system setup

- Attend training
- Get user manual
- Buy books
- Use help text & on-line tutorials
- Use templates

New software system setup

- Research scheduling techniques
- IT should attend technical support training
- Configure the application
- Develop project templates

Prepare Data

- Prepare data:
 - *Project data*
 - *Calendar information*
 - *Resource data*
 - *Activity records*
 - *Activity sequencing*

Project Data

- Main project details used to sets up the project file:
 - Project name
 - Project number
 - Project manager name
 - Project sponsor
 - May include stakeholders and/or work-stream leads etc

Calendar Data

- Data used to generate a calendar or time line:
 - Working day and week
 - Holidays
 - Annual leave
 - Working hours

Calendar Data

- Consider date format e.g. dd-mmm-yy instead of dd/mm/yy
- Project Start Date:
 - marks the beginning of the project
 - start date for the first task or activity is often used

Resource Data

- Recommended Resource Data:
 - Resource Code – an identifier code
 - Resource Name – name as it will appear on reports
 - Normal availability - % and dates
- Contingency planning: apply % to account for slippage e.g. 75% availability

Resource Data

- Additional Resource Data:
 - Calendar – any special calendar required
 - Cost Rate
 - ‘Threshold’ resource data incl. costs (Lock)
- Priority Rules understood
 - Time vs Resource limited
 - Priority to activities with least float

Activity Data

Mandatory Activity Data

- Activity ID number
- Predecessor and successor task ids
- Any constraints or dependencies
- Estimated activity or task duration

Activity Data

Optional Activity Data:

- Activity Description
- “Optimistic” and “Pessimistic” estimates
- Editing & sorting codes
- Resource Data
- Costs
- Special constraints
- Split-able activities
- Note: custom fields also available

Open First Project File

- Set default/preferred view on start-up
 - Gantt Chart
 - Calendar
 - Etc.

Enter Activity Data

- Tasks entered with resources, effort, and duration
- Activity Sequencing - process of identifying and documenting relationships between activities.
 - PDM (technique)
 - Start to Finish (SF), Finish to Start (FS), Finish to Finish (FF), Start to Start (SS)

Enter Activity Data

- Target Dates - scheduled dates or milestones
- Constraints:
 - Early date
 - Late date
 - Fixed date

The following table lists the constraints provided in Project.

CONSTRAINT TYPE	CONSTRAINT NAME	DESCRIPTION
Flexible	As Late As Possible (ALAP)	Schedules the task as late as possible with the task ending before the project ends and without delaying subsequent tasks. This is the default constraint for tasks when you schedule from the project finish date. Do not enter a task start or finish date with this constraint.
Flexible	As Soon As Possible (ASAP)	Schedules the task to begin as early as possible. This is the default constraint for tasks when you schedule from the project start date. Do not enter a start or finish date with this constraint.
Semi-Flexible	Start No Earlier Than (SNET)	Schedules the task to start on or after a specified date. Use this constraint to ensure that a task does not start before a specified date.
Semi-Flexible	Finish No Earlier Than (FNET)	Schedules the task to finish on or after a specified date. Use this constraint to ensure that a task does not finish before a certain date.
Semi-Flexible	Start No Later Than (SNLT)	Schedules the task to start on or before a specified date. Use this constraint to ensure that a task does not start after a specified date.
Semi-Flexible	Finish No Later Than (FNLT)	Schedules the task to finish on or before a specified date. Use this constraint to ensure that a task does not finish after a certain date.
Inflexible	Must Finish On (MFO)	Schedules the task to finish on a specified date. Sets the early, scheduled, and late finish dates to the date that you type and anchors the task in the schedule.
Inflexible	Must Start On (MSO)	Schedules the task to start on a specified date. Sets the early, scheduled, and late start dates to the date that you type and anchors the task in the schedule.

Time Analysis

- Software will perform passes through network to determine for each activity:
 - Earliest possible start & finish
 - Latest permissible start & finish
 - Float and critical path

ID	Task name	Duration	Early start	Early finish	Late start	Late finish	Free slack	Total slack
1	Project start	0 days	10 May '10	10 May '10	10 May '10	10 May '10	0 days	0 days
2	Dig trench and soakaway	2 days	10 May '10	11 May '10	02 Jun '10	03 Jun '10	0 days	17 days
3	Cut roof timbers	1 day	10 May '10	10 May '10	01 Jun '10	01 Jun '10	16 days	16 days
4	Make door frame	1 day	10 May '10	10 May '10	14 May '10	14 May '10	0 days	4 days
5	Dig foundations	4 days	10 May '10	13 May '10	10 May '10	13 May '10	0 days	0 days
6	Make doors	3 days	10 May '10	12 May '10	01 Jun '10	03 Jun '10	0 days	16 days
7	Position door frame	1 day	11 May '10	11 May '10	17 May '10	17 May '10	4 days	4 days
8	Concrete foundations	2 days	14 May '10	17 May '10	14 May '10	17 May '10	0 days	0 days
9	Prime doors	1 day	13 May '10	13 May '10	04 Jun '10	04 Jun '10	12 days	16 days
10	Build brick walls	10 days	18 May '10	31 May '10	18 May '10	31 May '10	0 days	0 days
11	Lay floor base	2 days	18 May '10	19 May '10	02 Jun '10	03 Jun '10	0 days	11 days

Data Entry Errors

- Obvious errors can be detected using a report sorted by activity code and/or review network diagram
- Software's error diagnostics will report some errors e.g. typos, and dates outside range
- Two types of errors (Lock):
 - Identifiable – error reported by software
 - Unidentifiable – no error reported

Data Entry Errors

- Identifiable Errors:
 - Invalid dates
 - Duplicate activity records (ids)
 - Dangles (no preceding or succeeding activities)
 - Loops (continuous loop)
 - No duration for activity with resource assigned

Data Entry Errors

- Unidentifiable Errors:
 - Incorrect activity duration
 - Incorrect task name
 - Incorrect constraint
 - Costs missing
 - Wrong resource assigned
- Errors reduced with PM experience and systems programming.

Steps to build first schedule

1. Install and Setup software
2. Prepare data
3. Open a new project file for first project
4. Enter all activity data for the project
5. Attempt time analysis
6. Correct errors
7. Run / execute the schedule

Build the Project Schedule

- Prepare data:
 - *Project data*
 - *Calendar information*
 - *Resource data*
 - *Activity records*
 - *Activity sequencing*
- Enter data for the project
- Attempt time analysis
- Correct any input errors

Summary

- Basic setup of computer schedules for projects
- Core data required – Project, Calendar, Resource & Activity
- Basic time analysis may be sufficient for low complexity projects
- Fix data entry errors

Computers & Project Management CMI

Week 6: Topic: Management of Resource Data & Reporting

Overview: Your projects won't get executed or completed unless the necessary resources are available at the right cost, in the right timeframes, and with sufficient quality (of machinery, of systems, of professional services, parts, materials etc.). This week, we'll look at issues around entering, defining and managing resource pools, rates, calendars etc.

Objectives:

- To learn more about control of Resource Data in computer schedules
- To gain an understanding of "Output Reports" e.g.
 - Standard & Customized
 - Filtering
 - Sorting

Introduction

A few areas relating to project schedules are covered this week. Some more information regarding the management and control of resource data is provided, such as the use of aggregation and levelling.

Project management tools or applications are used for project communications, project control etc. and the production of reports is one of the most important functions of these applications. The importance of sensible filtering and sorting is covered.

Some common functions of project management applications allow for:

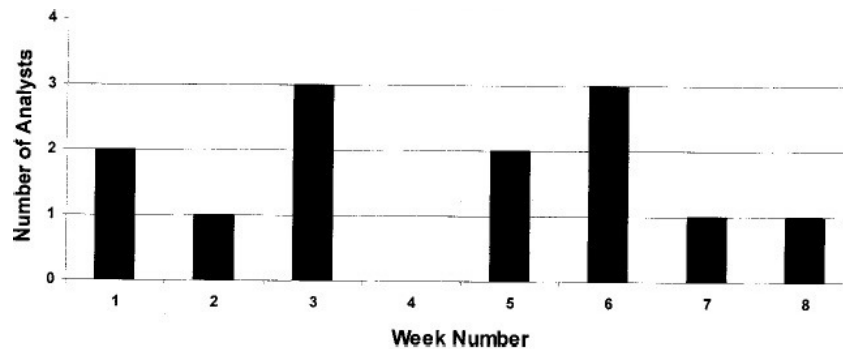
- Resource aggregation
- Resource levelling or scheduling

Resource Aggregation

Aggregation is the simplest of the automated scheduling methods available. As the title suggests, aggregation is little more than addition. The software simply schedules each activity at its earliest possible date, assigns the estimated number of resources for the period of the activity, and then repeats this for all other activities. No attempt is made to schedule activities at any time other than their earliest start.

As a result, aggregation is of relatively limited use in the project manager's tool-kit. It can produce schedules with a mix of resource overloads and with periods of under usage.

The PM software should allow the PM to view the resource aggregation for a schedule on a period-by-period basis, using a resource usage view or profile. This information is used to identify periods of peaks and troughs in resource requirements to allow the PM to plan accordingly and possibly look at smoothing out wide fluctuations.

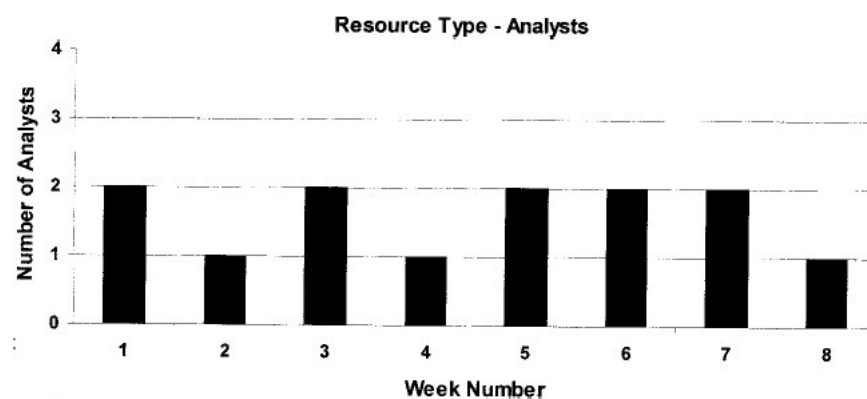


Example of Resource Aggregation chart.

Resource Levelling or Scheduling

Levelling, allows the Project Manager to ensure that resource availability and usage is optimised. Basically, resource levelling takes all the available resource data and re-allocates any extra or spare capacity found to other activities or tasks. This can result in significant savings e.g. you don't have resources on site without having work scheduled for them to perform. You may need to intervene manually to re-schedule any resources that have pre-set constraints e.g. must start or end on a particular date (you may need to bring in additional resources to resolve the constraint and thereby "level" the resources).

In order for resource levelling to be successful, the resource data provided needs to be accurate and relevant. For example, a software development project with 5 Java programmers with a similar skill set means that 5 Java programmers are practically interchangeable. When one of the 5 programmers has completed a task, an automated resource levelling function might re-assign that programmer to an outstanding task elsewhere. But if you have scarce or expensive resources on the project, you need to ensure that they are used in the most productive and cost-efficient way possible.



Example of Resource Aggregation chart after resource levelling.

In addition to the resource data, priority rules are required. Lock recommends the following be taken into account:

- Influence of float
- Time-limited scheduling
- Resource-limited scheduling

- You may also need to take quality issues into account i.e. in order to deliver the necessary quality, you may need additional resources, skills or to lengthen the time and / or phasing that some resources take to complete key tasks / activities.

All projects are subject to the relationship of the triple objectives – time, cost and quality. “Float” is often referred to as “slack” and basically means time available to move about.

The choice between time-limited scheduling and resource-limited scheduling is the classic project manager conundrum – not enough time so more people or use same number of people and take a little longer?

Limitations of Resource Levelling

The limitations to resource levelling are obvious, in particular for smaller projects. Most resource levelling functions will lead to peaks and troughs of activity where one particular resource type is assigned in one timeframe of activities. Using the example of the 5 Java programmers on a development project again, a resource levelling function may try to use all 5 programmers in concentrated bursts. This is fine technically but 4 of the programmers may be permanent employees with other duties and as a result of the resource scheduling, those 4 will only be shown available for 3 months out of a year. This is obviously not practical. Generally, the more people involved in a project the better a resource levelling function can work – simply because you can juggle people within the schedule to ensure you apply the right resources in the right quantities at the right time (i.e. minimise the constraints).

On smaller projects again, it is likely that the personal preferences of the project manager or project sponsor will be taken into account before task allocation is completed and this may lead to an element of forethought or experience allocating resources in a dynamic and optimised schedule – a) because they’ve done it before (maybe using a template from a previously successful project) b) because the project is small, it’s easy to predict exactly what resources will be needed and when.

A key thing to remember is that for resources that are “bought in” – you can schedule their availability but you can never guarantee it e.g. the plumber says he’ll be there on Monday but you find he’s away on holidays! That can impact on all your scheduling for other resources on tasks that come after the plumbers one.

“Work to List”

Resource levelling functions can generally provide a “Work to List” that provides an optimum sequence of tasks for the project team. Therefore, automated resource levelling is asking the question: “if you do it the way you’ve suggested, there are constraints – if you do it the way the computer systems suggests, there will be fewer constraints”. You then need to review the computer suggested schedule and see if it make sense in practical terms. You can often end up doing multiple iterations of resource levelling where you run levelling, adjust the schedule, re-run levelling, re-adjust the schedule etc.

Output Reports

There are two categories of output reports used in project management: **standard** and **customised** reports. All project management applications or tools offer standard reports. This also applies for MS Office applications, in particular summary sheets in Excel. Generally again, reports can be customised to suit the needs of the user. While most standard reports

will meet the needs of the Project Manager the software should allow users to generate custom reports based on any data field available in the program. This flexibility allows PMs to generate useful and relevant reports to suit their particular audience and reporting needs.

Reports do not have to be produced in hard copy and often take the form of “dashboards” or similar screens that portray the detail required. Many of the reports produced by project management applications do not suit print-outs (they may be too large) and tend to be used for internal, project team reporting & information.

Try printing a Gantt Chart from *MS Project* with a few hundred activities. It will run to several pages. It is vital to take the print output into account before handing a report over as it can create a bad impression of the project. Lock recommends ‘filtering’ and ‘sorting’ to solve this type of problem.

Filtering

‘Know your audience’ or in this case ‘your readership’. Filtering is basically editing reports or excluding unnecessary information – sometimes by summarising it - to include what the intended recipient wants or needs to see. Very few project stakeholders will be impressed by sheer bulk of unfiltered reports. Most high-level execs and sponsors are interested in e.g.:

- Are we on budget
- Are we on time
- Is product quality OK
- Any Risks likely to cause problems (short, medium, long term risk horizon)
- Any issues currently causing problems
- Is the project team working OK – getting all the assistance and resources they need?
- Key problems encountered and key improvements in the PM process that can be applied

The following options should be considered when filtering:

- Assigning departmental or other report codes to all activity records – as mentioned in cost / accounting codes etc. in last week’s session, the department and / or cost code should be included in the activity records and the resource data allowing filtering by department or cost code etc.
- Specifying milestones or key activities – again a case of knowing what matters to the reader.
- Reporting on selected resources – some resources on the project may be under pressure due to other responsibilities or be of particular interest to the reader.
- Choosing some other activity parameters – dependent on activity data available.

Filtering allows the generation of ‘Work to Lists’ by department and even by Individual if necessary, which will be of particular interest to department managers.

It makes sense to exclude completed tasks or tasks or items that are deemed confidential or commercially sensitive.

Sorting

The order in which data is presented is also important. This is achieved by using sorting.

Ideally sorting in reports should be possible by date, activity id, resource id etc. This is possible in MS Excel for instance.

For example, a PM may want a report sorted by activity id to help with checking for data entry errors. Whereas a team lead may want to see activities for their team members sorted by scheduled start date.

Combined Cost & Resource Table

Lock recommends these tables as helpful as the cost and duration of each activity is clear in a sequence e.g. costs for a task, work-stream, milestone etc. There is a concept similar to a WBS called a CBS that shows how costs are attributed to the project.

Date	Resource LA: Labourer				Resource SK: Skilled				Task	Cumulative
	Available	Used	Unused	Cost £	Available	Used	Unused	Cost £	materials project cost	£
10 May 10	1	1		120	1	1		160	50	330
11 May 10	1	1		120	1	1		160		610
12 May 10	1	1		120	1	1		160	100	990
13 May 10	1	1		120	1	1		160	100	1 370
14 May 10	1	1		120	1	1		160	175	1 825
17 May 10	1	1		120	1	1		160	525	2 630
18 May 10	1	1		120	1	1		160	65	2 975
19 May 10	1	1		120	1	1		160	65	3 320
20 May 10	1	1		120	1	1		160	65	3 665
21 May 10	1	1		120	1	1		160	65	4 010
24 May 10	1	1		120	1	1		160	65	4 355
25 May 10	1	1		120	1	1		160	65	4 700
26 May 10	1	1		120	1	1		160	65	5 045
27 May 10	1	1		120	1	1		160	65	5 390
28 May 10	1	1		120	1	1		160	65	5 735
31 May 10	1	1		120	1	1		160	65	6 080
01 Jun 10	1	1		120	1	1		160	40	6 400
02 Jun 10	1	1		120	1	1		160		6 680
03 Jun 10	1	1		120	1	1		160		6 960
04 Jun 10	1	1		120	1	1		160	65	7 305
07 Jun 10	1	1		120	1	1		160	55	7 640
08 Jun 10	1	1		120	1	1		160	200	8 120
09 Jun 10	1	1		120	1	1		160	360	8 760
10 Jun 10	1	1		120	1	1		160	40	9 080

Example of Combined Cost and Resource table report.

Project Summary Reports

As the name suggests these generally amount to one-page reports giving a management overview. The RAG (Red-Amber-Green) status (or ‘traffic light’) is a helpful way of providing a quick-glance report for people.

Another acronym used is “BRAG” – which is the same concept as above, but planned activities are coded in BLUE – to indicate that all the advance planning needed has been complete (e.g. to 50% or 75% or whatever).

For programs a concise summary showing status for each project may be required.

Bibliography and Further Reading

- Project Management, 9th Edition – Denis Lock (Gower).
- Guide to the Project Management Body of Knowledge (PMBOK), 4th edition, PMI.
- Managing Successful Project with PRINCE2, OGC 2005.
- Brilliant Project Management – Barker & Cole (Prentice-Hall)

- Dynamic Scheduling with Microsoft Office Project 2007 by Rodolfo Ambriz (J.Ross/International Institute for Learning) ISBN: 978-1-932159-87-5
- <http://www.jrosspub.com/Engine/Shopping/catalog.asp?store=12&category=189&item=14093&itpage=1>

Websites

- www.prince-officialsite.com – PRINCE2 website
- www.pmi.org – Project Management Institute
- www.ipma.ch – International Project Management Association
- www.projectmanagment9.com – support materials for Lock
- <http://blogs.msdn.com/b/project/archive/2008/10/30/back-to-basics-understanding-resource-leveling.aspx> - MS Project resource levelling example
- https://courses.worldcampus.psu.edu/welcome/pmangt/samplecontent/520lesson08/lesson08_06.html - Resource aggregation sample
- <http://www.stickyminds.com/sitewide.asp?Function=edetail&ObjectType=COL&ObjectID=10365> - Mapping Agile PM to PMBOK

Student preparation (informal):

To prepare yourself for the class, try having a look on the Internet for some of the sample files (links) above. These are easily located using Google searches such as “Project Scheduling”; “Project Resource Allocation”; “Project Schedule Control”; “Project Schedule Reports” etc.



Project Management Advanced Diploma



Computers & PM – Josephine Coffey

Computers & PM – Week 6

- Preparing the Computer Schedule
- **Resource Management & Reporting**

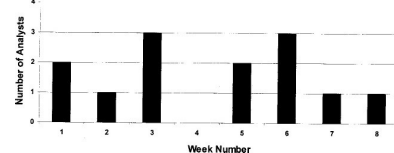
Computers & PM - Josephine Coffey

Objectives

- Managing Resource Data in computer schedules
- To gain an understanding of “Output Reports”

Resource Aggregation

- The software schedules activities at earliest start date with resources assigned
 - no attempt to optimise schedule
- Resource Aggregation chart
 - Resource usage profile
 - snapshot of resource requirements for schedule

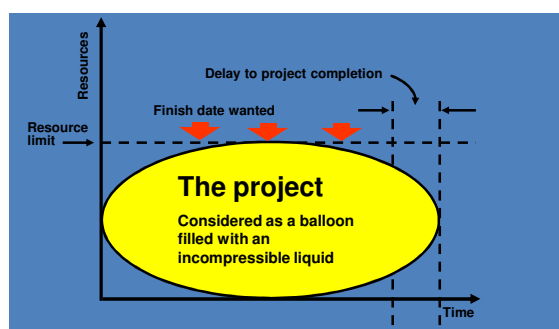


Resource Levelling or Scheduling

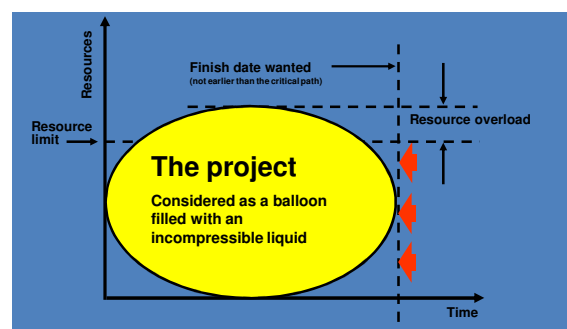
- Optimising resource availability and usage
 - Attempts to keep demand for resources constant
 - Need accurate & relevant resource data
 - Constraints will reduce effectiveness

Resource Levelling or Scheduling

- Priority rules (Lock):
 - Influence of float
 - Time-limited scheduling
 - Resource-limited scheduling
 - Quality issues



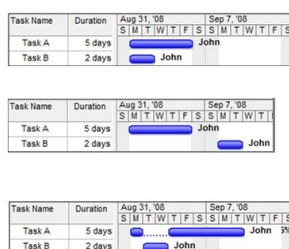
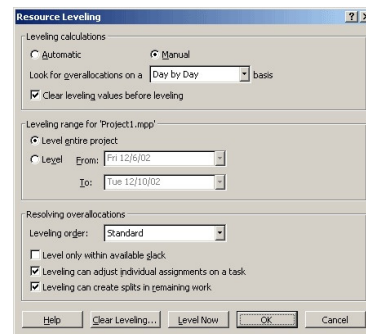
Time-limited *versus* resource-limited constraints
1: The resource-limited option



Time-limited *versus* resource-limited constraints
2: The time-limited option

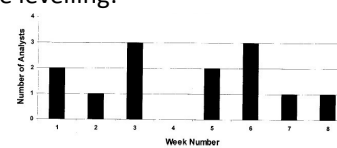
Resource Levelling or Scheduling

- Manual or automated in [software](#)
- Methods
 - Using software heuristics
 - Looking at activity float
 - [Splitting](#) tasks
 - Reviewing constraints
 - Reviewing priorities

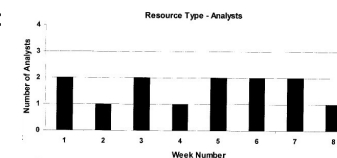


Resource Levelling or Scheduling

- Before levelling:



- After:



Limitations of Resource Levelling

- Peaks and troughs may still remain and need manual intervention
- Works better for larger projects and when resource requirements are close to numbers available
- Multiple iterations may be necessary
- Experience of PM and their knowledge of project & resources can not be automated!

“Work to List”

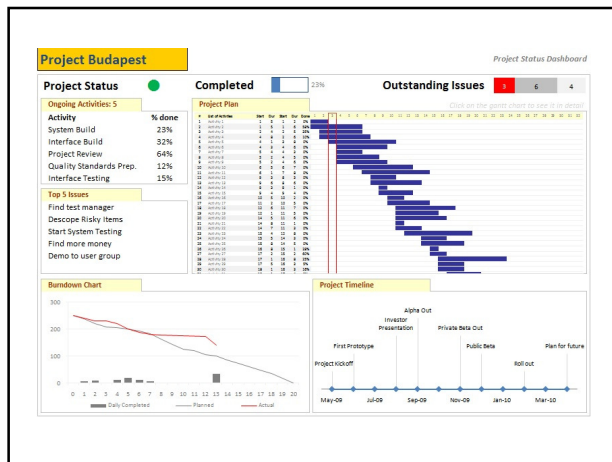
- View of activities showing ‘scheduled’ dates
- Recommended start and finish dates for each activity after resource scheduling process
- Needs to be reviewed by PM

Output Reports

- Reports are important communication and project tracking tool
- Two categories:
 - Standard reports (Built-in)
 - Customisable

Output Reports

- Often available in [‘dashboard’](#) form
- May be too large to print
- Lock recommends:
 - Filtering
 - Sorting



Output Reports - Filtering

- Editing reports to exclude unnecessary data
- Know your audience and filter accordingly
- Filtering options:
 - Assign report codes to activities
 - Specify milestone of key activities
 - Report on selected resources
 - Exclude unwanted data e.g. completed tasks, also confidential data
 - Choose some other parameter to reduce output size and target readers

Output Reports

- Sorting: reports should present data in sequence required by reader e.g. date, activity id, resource etc.
- Other useful reports:
 - [Combined cost & resource table](#) (Lock)
 - Project summary report (R-A-G)
 - Time Analysis Report
 - Resource Aggregation\Usage Profile

Date	Resource LA: Labourer				Resource SK: Skilled				Task	Cumulative
	Available	Used	Unused	Cost £	Available	Used	Unused	Cost £	materials project cost	£
10 May 10	1	1		120	1	1		160	50	330
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27 May 10	1	1		120	1	1		160	65	5 390
28 May 10	1	1		120	1	1		160	65	5 735
31 May 10	1	1		120	1	1		160	65	6 080
01 Jun 10	1	1		120	1	1		160	40	6 400
02 Jun 10	1	1		120	1	1		160		6 680
03 Jun 10	1	1		120	1	1		160		6 960
04 Jun 10	1	1		120	1	1		160	65	7 305
07 Jun 10	1	1		120	1	1		160	55	7 640
08 Jun 10	1	1		120	1	1		160	200	8 120
09 Jun 10	1	1		120	1	1		160	360	8 760
10 Jun 10	1	1		120	1	1		160	40	9 080

Summary

- Resource optimization may be necessary either automated or manual
- Output reports should be tailored to their audience and use filtering and sorting

Project Management Advanced Diploma

Computers & PM – Week 9

Josephine Coffey

Computers & PM – Week 9

- **Updating Schedules & Multi-Project Schedules**
- Large Networks, Risk Analysis and Standard Networks & Templates

Computers & PM - Josephine Coffey

Objectives

- Understand computer schedules and managing project progress
- Cover updating project schedules and gathering project information
- Creation and maintenance of multi-project schedules

Introduction

- Managing progress – keeping team moving in same direction
- Need consistency of approach and standards
- Keep progress accurately recorded, schedules up-to-date
- Reporting progress in a timely manner
- PR exercise

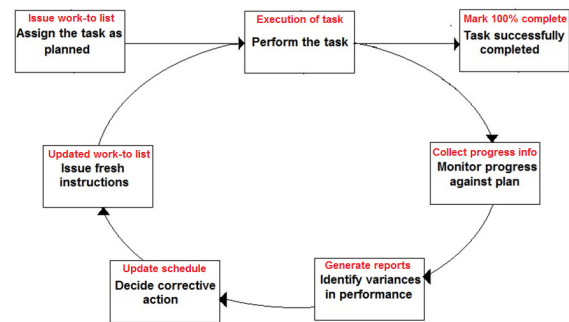
Closed Loop Systems

- Performance measurement routines built-in
- Recognises when system is performing outside expected / required tolerances
- Capable of making internal adjustments

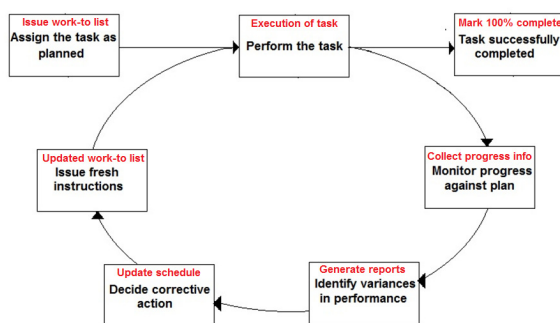
command – measure – feedback – correct

- at each level: task, milestone and project

Closed Loop Systems



Closed Loop System - PM



Management & Reporting Styles

- For example: forceful, commanding, adversarial, teaming, partnership
- Influence on project performance and success
- Influence on reporting and status updates
- Management by...
 - Exception (MbE)
 - Objectives (MbO)
 - Walking Around (MbWA)

Management by exception

- Closed Loop System – feedback of variance or exception
- Attention concentrated on problems in project
- PRINCE2 methodology
- Exceptions: variances PM cannot fix that directly impact time, cost or scope
 - Exception report
 - Project Board or Owner need to make decision

Exception Report

- Description and Cause of the Deviations
- Consequences of the Deviation
- The Available Options
- Options Appraisal
- Business Case – for the options available
- Risks
- Recommendations
- Sign Off

Management by Objectives

- Objective setting and meeting those objectives
- Project objectives should always be SMART
 - Specific
 - Measurable
 - Agreed
 - Realistic
 - Time-bound

Management By Walking Around

- PM available to the team, offers support and encouragement
- Walk-about can provide valuable source of information including:
 - Issues, risks, threats, opportunities, HR problems, lack of team synergy etc.

Updating Project Schedules

- Objectives of project need to be met regardless of reality v's baseline
- Plan\Schedule is constantly updated throughout lifecycle of project (Lock):
 - Changes in project parameters (cost, time, resources)
 - Changes in network logic
 - Progress updates for tasks
- Recommended to save a baseline of project before updates

Frequency of Updates

- Typically daily, weekly or monthly
- Influenced by
 - Management reporting needs
 - Level of risk
- Batch updates v's continuous updates directly into computer
- Need to balance keeping project on track and allowing team concentrate on tasks

Collecting Progress Information

- Simpler the better
 - Allow team to update schedule directly
 - Use website to enter progress
 - Emailing files (project file or spreadsheet)
 - Using timesheets to enter updates then PM updates schedule manually
 - Use of Task Lists (% complete update column)
 - Phone call to get update
- Be careful with % Complete progress updates

Collecting Progress Information

- Time-Now Data
 - Progress on all tasks marked against one date
 - "Status as at reporting date"

Contents of Task Progress Report (Lock):

- ✓ For every task which should start on or before time-now:
 - has the task started (or will it start by time-now)?
 - if not, why not?
- Plus a typed report of any difficulties or problems

Collecting Progress Information

- ✓ For every task in progress at time-now:
 - its expected finish date or
 - duration remaining or
 - percentage completed
 Plus a typed report of any difficulties or problems
- ✓ For every task that should have finished since the last check:
 - has it been finished?
 - if not, why not?
 - if it has been finished, can the following tasks start? (used to check network logic and true completion status)

Collecting Progress Information

- ✓ For every task running late:
 - how much float remains?
 - how much of that is free float?
 - what action needs to be taken?
 - what action *is* being taken?

Statistical Checks

- How many people should be working on this project (or task) today?
- How many people actually *are* working on this project (or task) at this moment?

Multi-Project Schedules

- Enterprise PM systems allow project files & data to be collaboratively shared
- Unique Task (Activity) Identifiers e.g.
TaskID = "PE0814_Tnnnn" where
 - Type=Project,
 - Owner = Engineering,
 - Year = 2008,
 - Engineering Project # = 14,
 - Tnnnn = Task number within that project
- Multi-location should support flexible calendars

Managing the Multi-project Model

- Discipline & consistency in the addition of data (project, resource, activity)
- Document\Configure: task naming conventions, activity types, resource pools, reporting filters, views and templates etc.
- Only skilled, appropriately trained people should be allowed to update

Managing the Multi-project Model

- Data Preparation:
 - Each project needs a comparable schedule, compatible with Master schedule
 - Resources defined with full portfolio of projects in mind
 - Non-project related work
 - Resource pool defined at Organisation level
 - Calendars defined for diff resource types

Prioritisation across Projects

- In-house prioritisation rules e.g. time-basis (earliest completion date)
- Use app wizards/prompts to discover scheduling issues and Set organisation “preferences”

Interface Activities

- Project dependencies, linked activities, shared constraints
- Lock: Interface tasks should have same identifier, however some software will not allow duplicates
- Dummy tasks can be used

Updating Intervals – Multi-Projects

- The more frequent the better as data feeds Portfolio level schedule
- Enter Project updates and then manually re-calculate schedule

What-If Testing

- PPM software should allow “what-if” analysis
- New projects slotted in at high-level to see Portfolio impact on time, cost and resources

Summary

- Closed Loop Systems allow for feedback and corrective action to take place in Projects.
- Accurate and timely task progress updates are necessary for successful PM.
- Management of multi-projects\portfolios brings added complexity and requires PPM software. Discipline & consistency required.

Computers & Project Management CMI

Week 9: Topic: Updating Schedules & Multi-project Schedules

Overview:

Once a robust and effective schedule has been created, and the project team know and have agreed to what is expected of them, then the project focus moves to execution and managing progress, which we will discuss this week. Also this week we will look at the considerations that need to be given to creating multi-project schedules and managing their progress.

Objectives:

- Gain an understanding of the links between the computer schedule and managing project progress:
 - Progress in a closed-loop control system
 - Management styles and the impact on tracking progress, including exception reports
- Cover updating project schedules and gathering project information:
 - Update frequency
 - Collecting progress information
 - Progress Checks
- Gain an understanding of the creation and maintenance of multi-project schedules
 - Multi-project model
 - Interface activities

Introduction

Managing progress entails keeping all project team members travelling in the one direction – the concepts of common goals, shared project mission, culture and organisational standards come into play here. Project management applications can assist within this process. Consistency of approach and formalisation of coding standards (standard values), update intervals (standard intervals), update requirements (common elements to be updated) etc. will all contribute to ensuring projects are executed with the consistency necessary to ensure the relevance of information. It is vital that the time is taken to keep progress accurately recorded, schedules & plans updated (e.g. new tasks or additional task break-out etc.) and to inform the relevant stakeholders in a timely manner as to current status.

Reporting and tracking progress can be as much about PR as it is about project management. You need to ensure that your reports reflect what is actually going on in the project though. Be careful not to over-cook the progress in the reports you are generating and always ensure the PM reporting system and your own “sense” of what’s going on tally. One of the most important lessons any project manager can learn is to keep abreast of things as they happen on a project otherwise the project itself can become unviable. This is where applications and rules for updating schedules come in. Even the simplest applications play a vital role in the control of all projects.

Closed Loop Systems

This sounds complicated but it is not. The diagram below outlines a closed-loop control system. In general, these are systems that have performance measurement routines inbuilt. These measurement routines can recognise when there system is performing outside expected / required tolerances. They are capable of making internal adjustments themselves e.g. add more coolant, increase pump pressure etc.

The diagram below provides a representation of a closed loop system. This model can be applied to individual tasks or deliverables or entire projects.

The principle is simple: **command – measure – feedback – correct**. In an ideal world corrections would never take place but corrections are required on most projects. Lock refers to these closed-loops as “cybernetic controls” due to its close analogy in electronics.

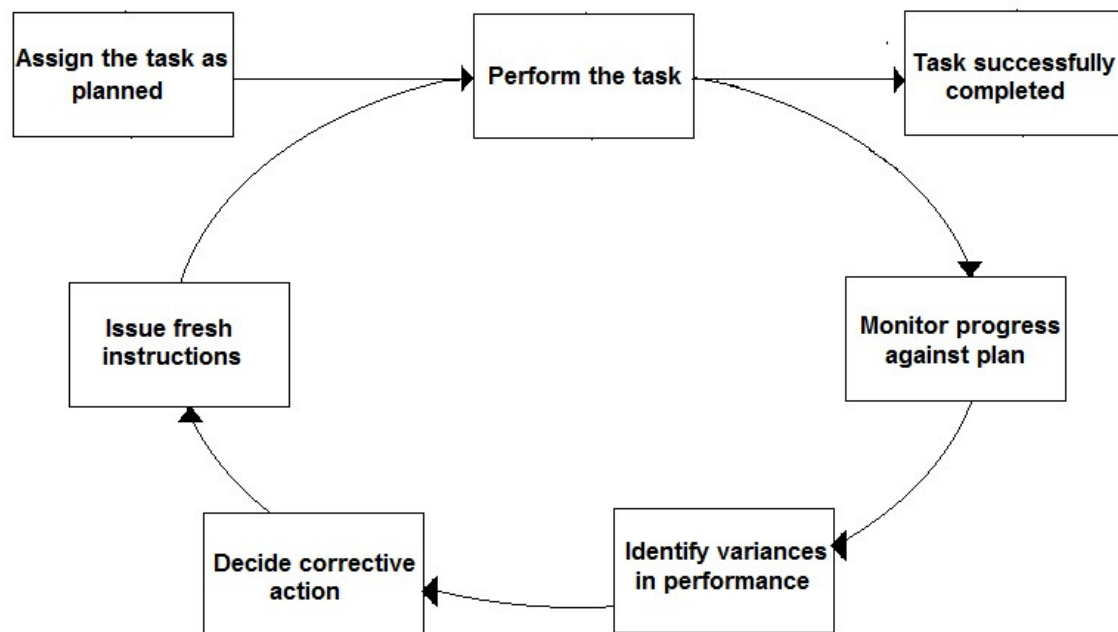


Figure 1 – Closed Loop

An open loop would mean that no corrections take place at all or no feedback is provided, meaning a task is “deemed” completed without confirmation that it has been completed successfully.

Generally speaking, systems should have some capacity inbuilt that demonstrates the following:

- Capacity to recognise system performance outside expected norms (i.e. under or over performance)
- A means by which adjustments can be made to the system to bring it back into the range of normal performance.
- Typically, these will exhibit the following capacity:
 - Ability to monitor
 - Ability to identify unwanted performance
 - Ability to incorporate changes to how the system operates

In project management terms, the project team becomes part of the system and, using the IT resources and reporting utilities available to them, they make adjustments to the project so that under performance (in particular) is corrected as swiftly and effectively as possible. Therefore, in its own way, a project team is a “system” that has been established to deliver a product for a sponsor / client.

Management & Reporting Styles

Management styles can have a significant influence on project performance and success. Organisational behaviour and culture can set the tone within an organisation overall and also within a given project or programme (of projects). On a project team, management styles can refer to a number of different things such as: forceful; commanding; adversarial; teaming; partnership etc. Each can be a style that suits the project and / or organisational context and can

be deliberately “chosen” as a management strategy by the senior project managers and sponsoring organisation.

In terms of reporting and status updates etc., there are a number of ways that a project can elect to monitor and report progress, over time. Some examples of these are outlined below.

Management by Exception & Exception Reports

The closed-loop control system shown above is dependent on the feedback of ‘error signals’ known to project managers as “variance” or “exceptions”. These exceptions then facilitate “management by exception”.

“Management by exception” is an accepted and effective approach to control. It means concentrating attention on project problems rather than wasting management time on tasks that are going according to plan and need no action.

Exception reporting is an essential element of management by exception. The PRINCE2 methodology relies heavily on exception reporting. In project terms, exceptions are those issues that arise that the project manager cannot fix and have a direct impact on the time, cost or scope of the project. Exceptions require a decision from the Project Board or project owner before the project can progress.

An Exception Report should generally include the following:

- Description and Cause of the Deviations
- Consequences of the Deviation
- The Available Options
- Options Appraisal
- Business Case – for the options available
- Risks
- Recommendations
- Sign Off

Management by Objectives

“Management by objectives” is another recognized technique, long championed by Peter Drucker (Management guru). Objective setting and meeting those objectives is what project management is all about.

It helps to remember that project objectives should always be SMART:

1. **Specific** – Objectives should specify what they want to achieve.
2. **Measurable** – You should be able to measure whether you are meeting the objectives or not.
3. **Agreed** - Are the objectives you set agreed with whomever is expected to meet the objective?
4. **Realistic** – Can you realistically achieve the objectives?
5. **Time-bound** – When do you want to achieve the set objectives?

Manage by Walking Around

Lock also espouses a less well documented management technique for the project manager to adopt, namely “management by walking about”. What Lock means is that the project manager cannot live in a cocoon but needs to be aware of what is actually happening on the ground with a project. This allows the project manager “an opportunity to give praise where praise has been earned, and offer encouragement so that project staff remain motivated for success.”

What is learned on these ‘walkabouts’ should then be punched into the project schedule, if it is appropriate to do so. Walk-about like this can also provide a very valuable source of information

in relation to for example: issues, risks, threats, opportunities, innovations, HR problems, lack of team synergy etc.

Updating Project Schedules

The project plan sets out the objectives for the project, including the times, resources, scope of requirements etc. As the project progresses through the project life cycle the original plan and the reality will digress.

Keeping fully abreast of all project activity is vital to ensure that regardless of the gap between the original or 'baseline' plan and the reality, the objectives of the project will still be met. The plan (PID in PRINCE2, "schedule" for Lock) is a living document that is constantly updated throughout the project. This does not mean re-writes or anything so drastic but the plan must be kept up to date so objectives continue to be met. To keep plans up to date the project manager must get regular progress reports on every active task.

Lock identifies 3 general reasons for changes to project schedules:

- A change in project parameters – resources, costs, timescale suddenly changes
- A change in "network logic" – Lock refers to the actual approach to a project as the network logic, the sequence of tasks that will lead to the attainment of the objectives for the project. A change to this logic will mean the schedule needs to be updated.
- Update with progress on specific tasks, i.e. recording progress.

It is also recommended that a baseline of the originally planned schedule is saved before updates are made. This will allow the PM to compare the actual plan to the baseline as the project progresses and also once the project has been completed.

Frequency of Updates

Some managers update their plans continuously and progress information is entered directly into the computer as soon as it is known. This is not straightforward on large projects or in situations where the resource working on the task is not in a position to update the schedule. (Project support or project administrators can assist here.) A key influence here will obviously be the frequency with which management require status updates. Another influence may be the complexity of the project and therefore the level of risk associated with it. In a high risk project, it may pay off to track and report on it more frequently. That way, you have all the necessary updates coming in to the project office and you are more likely to identify potential problems before they get out of control.

It is often simpler to update schedules with all latest available information in one go, thereby keeping things consistent. Depending on the nature of the project such 'batch' updates could take place daily, weekly or monthly.

The balance between keeping the project on track and the need to allow those working on the project to concentrate on the tasks assigned to them needs to be tailored to fit.

Collecting Progress Information

Generally, the more straightforward the approach is to the collection of progress information the better. Collecting progress is more straightforward where all project team members have access to the schedule or an application that will update the schedule. Progress information collection should become a routine part of every project. Collection can be done by a number of computerised methods, some of which might be:

- Emailing in Project Schedule files (e.g. MS Project file for a sub-project)
- Emailing in Excel update sheets (perhaps a standardised project update Spreadsheet)
- Accessing the master schedule over the network and updating those files and tasks to which computer access has been granted.
- Updating the schedule through a purpose built web frontend.
- Submission of timesheets for each resource or workstream so that effort (time) updates and completion estimates (% complete) can be manually entered into the master schedule.

Use of Task Lists

As indicated above, if tasks or activities have been assigned directly it makes sense to request progress updates on a task by task basis. This may be as simple as a phone call to enquire how the far along the task is or may involve the submission of RAG status reports on a task list.

The use of “% complete” generally appears on these sorts of reports or lists, including on MS Project Gantt Charts. This is fine in terms of the duration of the task but recording a % completion rate for the task itself is a dangerous tactic for a project manager. Recording a task as 50% complete gives the reader the distinct impression that 50% remains and it will take exactly the same amount of money and time to complete the second half when this is rarely the case on projects. You need to be certain that 50% of the time allocated actually translates to delivery of 50% completion status (i.e. efficiency of the resource completing the task in question). We’ll look at this in a later session in terms of Earned Value calculation as a schedule and cost performance measurement / tracking approach.

Time-Now Data

Lock recommends the use of the ‘time-now’ data approach. This basically means asking all those reporting progress to mark all tasks against one date i.e. status as at reporting date – usually the day that all progress updates take place. If you don’t do this, people may report status against a variety of as-at dates and this will distort the accuracy of your reporting.

Lock’s recommended content:

1. For every task which should start on or before time-now:
 - Has the task started (or will it start by time-now)?
 - If not, why not?
 Plus a typed report of any difficulties or problems
2. For every task in progress at time-now:
 - Its expected finish date or
 - duration remaining or
 - percentage completed
 Plus a typed report of any difficulties or problems
3. For every task that should have finished since the last check:
 - Has it been finished?
 - If not, why not?
 - If it has been finished, can the following tasks start? (network logic check)
4. For every task running late:
 - How much float remains?
 - How much of that is free float?
 - What action needs to be taken?
 - What action *is* being taken?

Typically, all of the above reports can be generated from within the Project Management Software – bearing in mind the old adage “garbage in – garbage out” your reports should provide up to date and timely information on project status and issues arising.

Statistical Checks

Many PM computer applications offer sophisticated functions that will churn the available data in the schedule or plan and provide figures and graphs etc. The following are two simple checks that can be of great assistance when reviewing a schedule without the benefit of these applications:

- How many people should be working on this project (or task) today?
- How many people actually *are* working on this project (or task) at this moment?

Multi-Project Schedules

Previously, we noted the distinction between individual projects, portfolios of projects and programmes. It is in the planning and the control of multiple projects that project portfolio management applications really come into their own. Enterprise project management systems allow project files and data to be collaboratively shared and accessed across countries, organisations, divisions, departments and teams etc.

Some of the key characteristics that multi-project PM applications need to consider are, for example:

The need for Unique Task (Activity) Identifiers

Consistency of coding in activity records and updates across multiple projects is essential. Task similarities between projects (e.g. tasks in two related projects with the same task descriptor / name) can lead to problems and confusion. Unique identifier codes on tasks or activities are essential so that all the tasks can remain within their own parent projects from an ownership & reporting perspective, at any rate. These codes also allow the project management organisation to “slice & dice” the project tasks and related task attributes & information. Reports, filters and status updates etc. can be devised to show progress from a variety of viewpoints.

“Dice & slice” capabilities can be an important component of stakeholder management, communications and reporting processes with a multi-project programme of works. Some applications will allow automatic inclusion of a Project identifier as part of each project task. They will automatically assign a project identifier tag to all tasks e.g. TaskID = “PE0814_Tnnnn” (Type=Project, Owner = Engineering, Year = 2008, Engineering Project # = 14, Tnnnn = Task number within that project). Applications that can do this will have been designed to work in a multi-project or distributed project environment. With others, you may have to add these identifiers in manually e.g. use a custom text field to enter the project Identifier for the task.

Primavera and MS Project Server support this collaborative work approach. The benefit of multi-project, multi location PM systems is that they can be configured to support calendars across International boundaries. This allows work to be passed along an organisation so that while one time zone sleeps, another continues on with the project etc. Another dimension to the international systems is the fact that it allows the sponsoring organisation to avail of lower labour costs in some areas and increased technical expertise in others.

Managing the Multi-project Model

- Discipline is the key to managing multiple projects plans and schedules. Consistency in the addition of data (project, resource, activity) is required.
- You need to document and / or configure your task naming conventions, activity types, resource pools, reporting filters, views and templates etc. so that only official standards can

be used. Allowing people to develop their own “ways of doing things” can lead to misinterpretation of meaning across project groups and teams.

- Only skilled, appropriately trained people should be allowed (have access) to update.

Data Preparation

- Individual projects require individual schedules or plans. These need to be comparable and need to be compatible with the PMO or Master project planning system. Some of the more popular high-end systems will support import of project schedules and plans from multiple other vendors e.g. Primavera will read in an Excel file (providing it has been properly formatted) or an MS Project file and incorporate it into the existing project or programme schedule (often with assistance from a schedule resource in the PMO).
- Resource Definitions - resource data needs to be recorded with the full portfolio of projects in mind.
 - Non-project or ‘line’ / overhead / administration work needs to be taken into account – since it will ultimately be charged against the project budget.
 - A resource pool can be defined by the project organisation. Charge rates (standard, overtime, holidays, callout charge etc.) can be attached to the resource.
 - Calendars can be defined for different resource types e.g. professions, geographic zones, factories, machinery etc. Resources defined in the resource pool can be attached to a calendar so that any attempt to schedule a resource outside the calendar will result in either an error or advisory message or an automatic adjustment of task end dates (or maybe a suggestion that you need to add more resources to complete the task in time).

Prioritisation across Projects

- In-house prioritisation rules need to be set before resources can be allocated to allow applications to make recommendations. This can be on a time-basis, i.e. the project with the earliest completion date is the highest priority project. It is rarely this simple however. No application can solve organisational problems related to personal preferences and office politics. The approach or methodology adopted is what matters.
- Many applications have “wizards” and “prompts” to let you know when there is a potential or actual problem in a schedule. As you become more expert with an application, you can turn these prompts off. However, they are a useful way to allow your organisational “preferences” to be reflected by the application when novice or new schedule (software) controllers are working on your projects.

Interface Activities

- Some tasks end up being listed for more than one project or activities are linked by shared constraints. It can be the case that an entire project is reliant on another project, in which case the interface activity is the final activity on that project. Equally, a deliverable from a sub-project (maybe at a sub-contractor organisation) may be on the main programme critical path. This would mean that a delay at the subcontractor could delay the critical path for the programme. Definitely one for your risk managers! Lock suggests that interface activities that are actually the same task should have the same identifier. This is however not possible on many applications. Most applications allow linkages which are easier to handle. In network diagrams (AOA or AON) dependencies across projects are often indicated by “dummy” activities – these allow the external dependency to be represented graphically and maintain the “logic” of the overall programme network.

Updating Intervals

- As each project update will need to feed to the portfolio schedule, the more frequent the updates the better. Some planners recommend that you do not allow the software system to automatically update the schedule as it can cause changes and errors to go unchallenged or unnoticed. Generally speaking it is probably best to enter your updates and then manually (i.e. press a button or run a command) get the application to re-calculate the schedule, based on your task updates.

What If testing?

- Project management applications generally include a function that allows ‘what if’ comparisons. New projects can be slotted in at a high level and the impact on resources fed back or priorities can be changed to see the impact on resources or timescales.

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- www.prince-officialsite.com – PRINCE2 website
- www.pmi.org – Project Management Institute
- www.ipma.ch – International Project Management Association
- www.esi-intl.co.uk/PM9/ – support materials for Lock

Computers & Project Management CMI

Week 9: Topics: Large Networks, Risk Analysis and Standard Networks & Templates

Overview:

- Large Networks
 - Rolling Wave Planning
 - Coding of activities – filtering & sorting
 - Hierarchical network breakdown
- Risk Analysis Techniques
 - PERT
 - Monte Carlo Analysis
- Standard Networks & Templates

Objectives:

- Gain an understanding of the difficulties associated with large networks and how to effectively deal with these.
- Review two risk analysis methods: PERT & Monte Carlo Analysis.
- Understand the use of standard networks & templates

Introduction

This week, some of the “less frequently” used tools and techniques available to project managers are introduced. Quantitative Risk Analysis has become an important component of project management and we will review two risk analysis methods. We will also look at ways to deal with the problems encountered when planning large projects. Finally we will look at the use of standard networks and templates to help bring about efficiencies and process improvements in the management of projects.

Large Projects

Difficulties large projects pose to a PM

A large network may have thousands or even tens of thousands of activities that need to be identified, scheduled and managed. In the past this would have resulted in project plans that covered the walls of a large room. Very large network diagrams, Gantt charts and output reports can be unmanageable especially when displayed on computer screens or even in printed format.

Some of the difficulties a PM will encounter when working with large networks are:

- Difficult to display large networks – even the largest of computer screens will have difficulty displaying a readable network diagram or Gantt chart for a large network. To understand and manage the project plan effectively it really needs to be viewed in its entirety at least at a summary or milestone level. The same is true of output reports, the audience will soon grow tired of reviewing a large several page report unless there is a summary presented.
- Difficult to print – printouts of large networks can span many pages in both length and width, these pages then need to be assembled into the correct sequence for display. The result can be difficult to follow. Large plotters can be used to print the network but these are not always readily available.
- Prone to errors – there is a greater risk of data entry errors when there are large numbers of activities to be added and the task of comparing and reviewing the data to catch errors becomes very time consuming. Of course when it comes to updating the schedule with the

latest status information there is also a greater risk that at least some records will contain errors and skew the progress and/or delivery dates.

- Difficult to keep up-to-date – the sheer number of records in a large network may make the task of updating the plan with the latest status information a time consuming undertaking. This can result in the plan becoming out-of-date quickly and dissuade or even prevent the project from adding changes during the post-planning phases.
- Different levels of detail required by different people in the project organisation – for example senior managers may need just a summary level plan, whereas those at middle management level would need an intermediate level of detail and may need information that is department or team specific. Supervisors require more day-to-day detail.
- Some information not known or understood in large networks that span a long timeframe – projects that are expected to span several years may have adequate detail for the early stages but beyond a certain time period information may be vague or non-existent.

Now we will look at three techniques to address these difficulties: Rolling Wave Analysis, Filtering & Sorting of data and Hierarchical Network Breakdown.

Rolling Wave Planning

Although Lock refers to “Rolling Wave” planning as one of the “less frequently” used techniques, versions of rolling wave planning appear in most project management methodologies and in PRINCE2 in particular.

The rolling wave approach acknowledges that project planners do not know everything relating to the project and how it will progress at the start of the project, particularly when a project may be very large and span several years. To get around this, the project is broken into stages with details added to each stage plan as the project progresses.

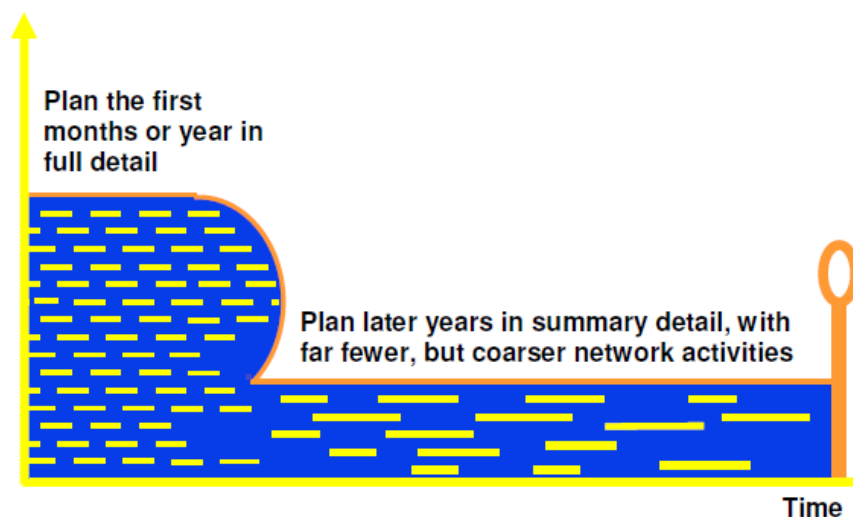


Figure 1 – Rolling Wave Planning (Lock) – Outset

The diagram shows many small activities and detailed logic near the project start, with the later stages showing relatively fewer but larger activities as the final completion activity is approached. These larger activities may correspond to large items of work that have not yet been broken down.

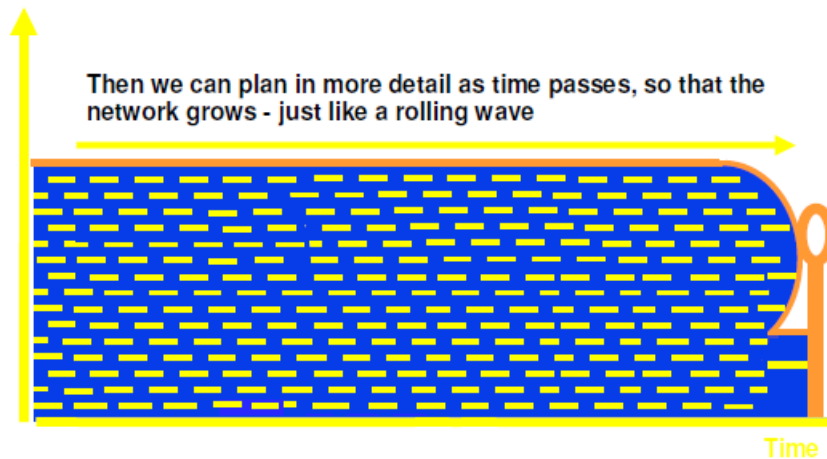


Figure 2 – Rolling Wave Planning (Lock) – Towards Conclusion

The upshot of rolling wave planning for the project manager is the need to update the plan or schedule as the project progresses. Once the stages are determined (or estimated) at the outset of the project these updates can be anticipated in advance.

Usually rolling wave planning needs to stay as least two to three months ahead of the actual work being done, but this can vary by industry.

Filtering and Sorting large projects

As we discussed in Week 6 coding of activities in a way that makes sense to the organisation, allows the PM to sensibly filter and sort the plan to meet the needs of its audience.

It is possible to create one large network for the project and then use the coding of activities and resources to allow effective filtering and sorting of data.

Department codes can be assigned to activities allowing the filtering of data to show only activities for which a particular manager is responsible.

Milestone activities can be created that mark an event, a stage or an achievement in a project. The PM software can then be used to produce schedules and reports that only contain milestones, which should meet the needs of management.

The allocation of resource codes is particularly useful for large projects, to identify resource types. This data can then be used to produce schedules and outputs that only pertain to a specified resource type. Thus the software can filter and sort by both department and resource skills (e.g. skilled, labourer).

There are many other codes that can be used to meet a particular organisations needs for filtering and sorting and these should be considered including – security level codes and OBS level codes. As well as the option to filter on a text string within a field such as the activity description.

Hierarchical network breakdown

It is possible to create networks with sufficient level of detail that do not have many thousands of activities, by creating a hierarchy of subnetworks.

This approach to the breakdown of large project networks recommends the creation of a main or summary network that is then broken down into several more detailed subnetworks.

One way to attempt this is to use the WBS, work packages can be planned separately and have their own smaller network diagram.

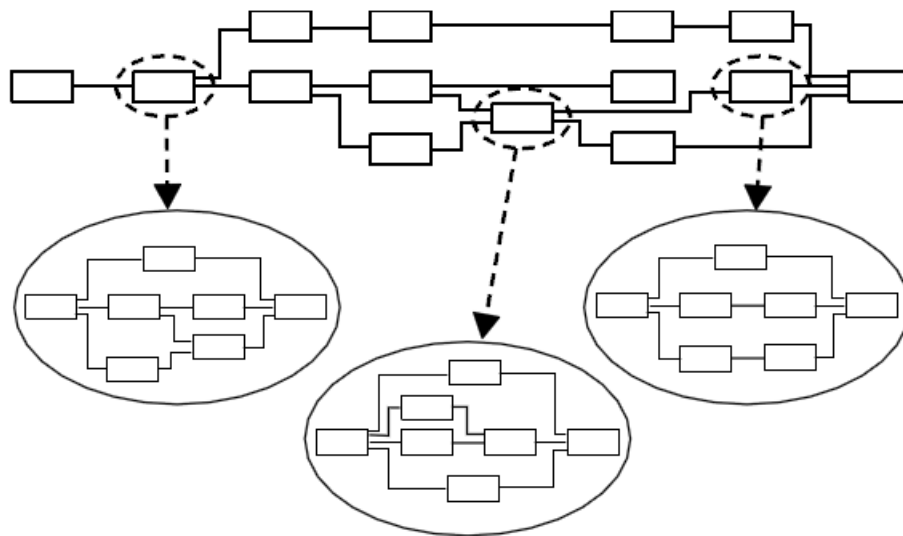


Figure 3 - Example of a large network broken down into subnetworks (Lock).

PERT (Program (or Project) Evaluation and Review Technique)

Most project plans are deterministic. This means that the project manager believes that every task duration estimate is achievable and is determined to see that the project is finished on time. PERT allows for some uncertainty in these determinations. The PERT model was developed in 1950s to address uncertainty in the estimation of project parameters.

PERT allows three different duration estimates for each activity. It calculates the expected time for each activity from the expression:

$$t_e = \frac{t_o + 4t_m + t_p}{6}$$

Where:

t_o = the most optimistic time estimate

t_m = the most likely time estimate

t_p = the most pessimistic time estimate

t_e = the expected time

Or put more simply:

$$\frac{\text{shortest time} + 4 \times \text{likely time} + \text{longest time}}{6} = \text{expected time}$$

PERT estimates are usually represented using the following notation:

Early Start	Duration	Early Finish
Task Name		
Late Start	Slack	Late Finish

Figure 4 – PERT Notation

Some PM software will allow you to enter PERT estimates, calculate the expected durations and view the results in the Gantt chart and output reports so that analysis can be performed. PERT software add-ons are also available.

PERT has some limitations, mainly associated with how accurately the estimations are for the optimistic, most likely and pessimistic task durations. PERT is recommended for quantitative risk analysis if you have accurate estimates based on reliable historical data.

To overcome the challenges associated with the PERT method, Monte Carlo simulations can be used as an alternative.

Monte Carlo Analysis

Monte Carlo simulation was named for Monte Carlo, Monaco, where the primary attractions are casinos containing games of chance. Games of chance such as roulette wheels, dice, and slot machines, exhibit random behaviour. We have the creators of the atomic bomb to thanks for inventing Monte Carlo analysis and it is now applied in scientific calculations, financial analysis (particularly pricing models) and in the calculation of risk for projects.

The random behaviour in games of chance is similar to how Monte Carlo simulation selects variable values at random to simulate a model. When you roll a die, you know that a 1, 2, 3, 4, 5, or 6 will come up, but you don't know which for any particular roll. It's the same with the variables that have a known range of values but an uncertain value for any particular time or event (e.g. interest rates, staffing needs, stock prices, inventory, and phone calls per minute).

The Monte Carlo process begins, like PERT, by making three estimates for every parameter that has any uncertainty. Thus, as with PERT, tasks in the network are each assigned three durations (optimistic, most likely and pessimistic). After that, the similarities end. Monte Carlo analysis uses thousands of randomly generated iterations of the estimates provided based upon pre-set probabilities.

To run Monte Carlo analysis an application is required. Some of those available include *Crystal Ball* from Oracle (uses MS Excel) and *@Risk* (available for both MS Project and MS Excel)

"Monte Carlo Simulation"

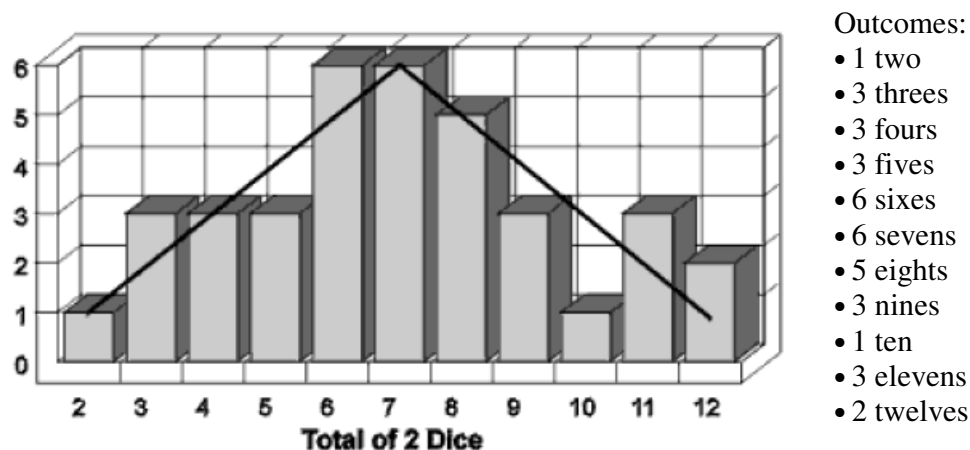
The basic concept of the technique is best described through illustration. We all know that a normal six sided die with the numbers one through six on each of the faces has an equal chance of showing any of the six numbers on any one roll. Statisticians would say that the results of a roll are "uniformly distributed" between one and six, and that the results of any one roll of the die represented a "random number" sampled from that uniform distribution. This is very fancy language for a very simple concept, but the language becomes more useful as we get deeper into the Monte Carlo method.

Now, suppose that you wanted to know what the chances were that the numbers on a normal pair of dice would total seven when rolled. While there are many ways to solve this question mathematically, one simple method would be to roll the dice many times and count the

proportion of times that the total is actually seven. If for instance, you rolled them 36 times and they totalled seven on six occasions, you might deduce that the chances of getting a seven were one in six, or 16.7%. As it happens, you would be exactly right in this instance. However, the dice could have shown seven on ten occasions. In this case, the results of your "simulation" would have been misleading, unless you had the judgment to take the results with a grain of salt. The results of rolling a pair of dice are random after all, and the chances of rolling a seven the precise six times required here are rather small.

If, however, we were interested in the **average** number shown on the dice in the same 36 rolls, you typically would find that the total of the numbers on the dice divided by the 36 rolls was close to seven. In other words, your simulation was a rather good predictor of the average result, while not necessarily giving you accurate information about the probability of any individual result occurring.

To continue the illustration, suppose that you were interested in describing the "spread" of your simulation results. One common method of doing this is to show the results in what is known as a "bar graph" or "histogram". Suppose that the results of your 36 rolls were:



The bar graph of these results is shown to the left of the table. Each bar is proportionally as high as the number of times that the result occurred, so that the bar for the result of three is three times as high as the bar for the result of two. Such a graph is a useful tool to describe the results of your simulation, although you would not believe that it accurately represented the chances of rolling a particular total, since the results are random. One thing you might do, however, is draw a smooth line over the results, as has been done here, and think that such a line might come close to the tops of a bar graph of a "perfect" simulation". In this case, you would be right, since the triangle shape is the actual underlying "probability distribution" of the sum of two die.

While the bar graph is a good picture of the results of the simulation, statisticians typically use two particular numbers to describe the same thing in summarized form. The first statistic is the "mean" or average result. This is determined by adding all the results, and dividing the total by the number of trials. In this case, the average result is $290/36$ or 8.06. The second statistic is called the "standard deviation". It is a measure of the "spread" of the distribution, and is, mathematically, the square root of the sum of the squares of the deviations from the mean divided by the number of trials. While that is a confusing definition, the use of the statistic in the context of Risk Analysis is quite simple. Since the standard deviation measures the spread of the results, it is a good measure of the amount of risk in the simulation results.

Although the dice illustration is quite simple, a statistician would say that we have just conducted a Monte Carlo Simulation for 36 trials in order to describe the probability distribution of the total

shown on a pair of dice. In order to do so, we have sampled two random numbers from a uniform probability distribution between one and six, and performed a mathematical operation (adding the two numbers together) on the pair of random numbers.

The Risk Analysis used in Project Management is performed in exactly this fashion.

However, there are a few differences due to the nature of the real-life situation we are simulating.

Standard Networks & Templates

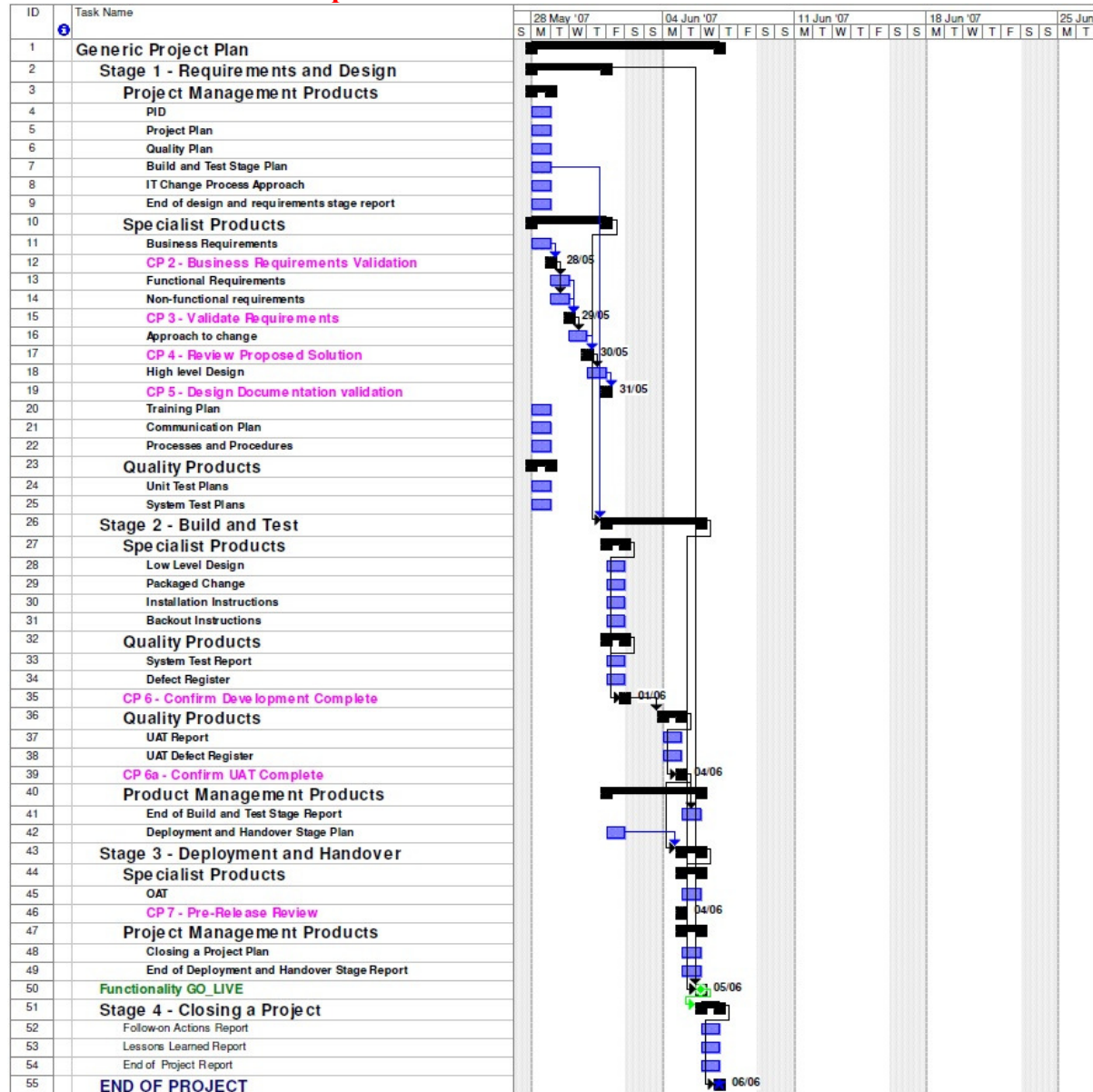


Figure 5 – Generic Development Project Plan Template

It is true that no two projects are identical. It is also true that there are common characteristics between projects within most organisations. Most organisations can therefore use and re-use standard project plans (or networks) and amend accordingly. For example, a standard plan for a construction firm a house and a garage so if a house without a garage is required, simply remove those activities related to the garage from the project plan.

Lock refers to these as “Standard Networks” and the saved versions as “Templates”. (Some templates for various project documents were introduced in Week 3.)

Standard networks or plans (such as the *MS Project* example in Figure 5) should be saved together in “libraries” and a record of the content and type of project each plan applies to should be stored also - a simple spreadsheet will suffice for this piece.

Care should be taken not to overwrite templates when one is in use and the “Task” or “Activity” identifier will need to reflect the name of the project.

Bibliography and Further Reading

- Project Management, 9th Edition – Denis Lock (Gower)
- Guide to the Project Management Body of Knowledge (PMBOK), 4th edition, PMI.
- Managing Successful Project with PRINCE2, OGC 2005
- Brilliant Project Management – Barker & Cole (Prentice-Hall)

Websites

- www.prince-officialsite.com – PRINCE2 website
- www.pmi.org – Project Management Institute
- www.ipma.ch – International Project Management Association
- <http://www.esi-intl.co.uk/PM9/> – support materials for Lock
- <http://www.oracle.com/crystalball/index.html> - Crystal Ball from Oracle
- <http://www.palisade.com/products.asp> - @Risk from Palisade
- MS Excel sample Monte Carlo simulation:
Link: <https://support.office.com/en-ca/article/Introduction-to-Monte-Carlo-simulation-64c0ba99-752a-4fa8-bbd3-4450d8db16f1>

Student preparation (informal):

To prepare yourself for the class, try having a look on the Internet for some of the sample files (links) above. These are easily located using Google searches such as “Monte Carlo Analysis”; “PERT risk assessment”; “Project Schedule Risk”; “Project Cost Risk” etc.

Project Management Advanced Diploma

Computers & PM – Week 9

Josephine Coffey

Computers & PM – Week 9

- Updating Schedules & Multi-Project Schedules
- **Large Networks, Risk Analysis and Standard Networks & Templates**

Computers & PM - Josephine Coffey

Objectives

- Understand difficulties associated with large networks and how to effectively deal them
- Review two risk analysis methods: PERT & Monte Carlo Analysis
- Understand the use of standard networks & templates

Large Projects\Networks

- Thousands or tens of thousands of activities
- Difficulties for PM include:
 - Difficult to display large networks
 - Difficult to print
 - Prone to errors
 - Difficult to keep up-to-date
 - Different levels of detail required
 - Not all information known or understood upfront

Large Networks

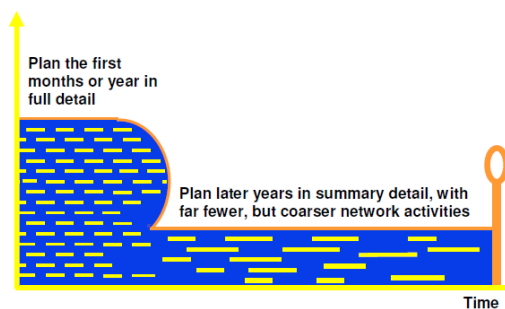
Some techniques for handling large projects:

- Rolling Wave Planning
- Filtering and Sorting large projects
- Hierarchical network breakdown

Rolling Wave Planning

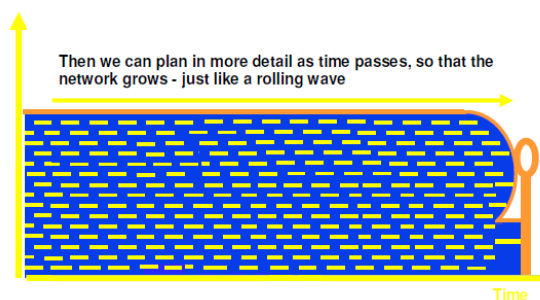
- Part of PRINCE2 methodology
- Used for large projects with long time span
- Not all information known at the project start
- Project broken into stages, details added to each stage as project progresses
- Once stages determined at outset then updates can be anticipated in advance

Rolling Wave Planning



Rolling Wave Planning (Lock) – Outset

Rolling Wave Planning



Rolling Wave Planning (Lock) – Towards Conclusion

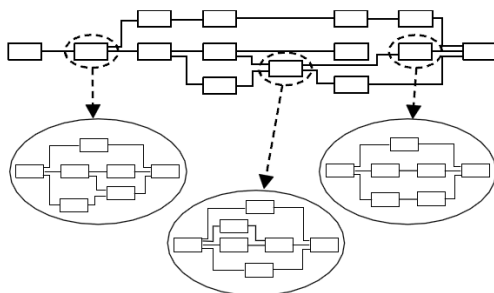
Filtering and Sorting large projects

- Coding of activities to allow filtering & sorting
- Department codes
- Milestone activities
- Resource Types\Resource codes
- Other:
 - Security level codes
 - OBS level codes
 - Custom fields

Hierarchical network breakdown

- Hierarchy of sub-networks
- Summary network broken down into several more detailed sub-networks
- WBS: work packages planned separately with smaller network diagram

Hierarchical network breakdown



Example of a large network broken down into sub-networks (Lock)

Quantitative Risk Analysis

- PERT - Program (or Project) Evaluation and Review Technique
- Monte Carlo Analysis

Steps to Risk Analysis

1. Identify Tasks
2. Create the CPM schedule
3. Estimate the uncertainty in the activity durations
4. Perform risk analysis
5. Take steps to mitigate the risks

PERT

- Most Project plans deterministic
- PERT is more sceptical and allows for some uncertainty
- Uses three different time durations to calculate expected time for each activity:
 - most optimistic
 - most likely
 - most pessimistic

PERT

$$t_e = \frac{t_o + 4 t_m + t_p}{6}$$

Where:

t_o = the most optimistic time estimate

t_m = the most likely time estimate

t_p = the most pessimistic time estimate

t_e = the expected time

$$\text{expected time} = \frac{\text{shortest time} + 4 \times \text{likely time} + \text{longest time}}{6}$$

PERT

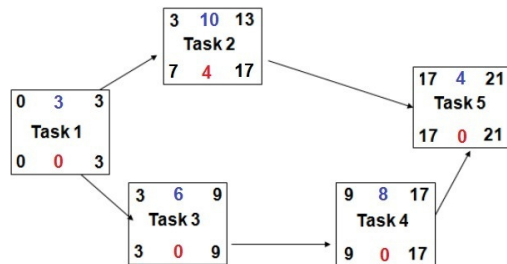
- PERT notation:

Early Start	Duration	Early Finish
Task Name		
Late Start	Slack	Late Finish

Limitations:

Only recommended when accurate estimates based on reliable historical data

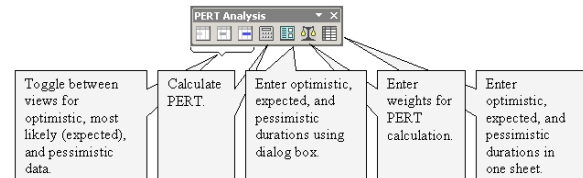
PERT



Source: <http://www.pmstudy.com/trainingdocs2/TimeManagementFormulae.pdf>

PERT

PERT in MS Project 2007



Need Add-in for more recent versions of MS Project.

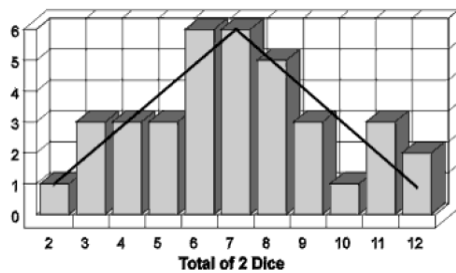
Monte Carlo

- Monte Carlo analysis applied in scientific calculations, financial analysis and in calculation of risk for projects
- Monte Carlo simulation selects variable values at random to simulate a model
- Variables have a known range of values but an uncertain value for any particular time or event (dice variables: 1,2,3,4,5,6 roll: ??)
 – e.g. interest rates, staffing needs, stock prices, inventory and phone calls per minute

Monte Carlo

- Like PERT uses three time estimates (t_o , t_m , t_p)
- Uses thousands of randomly generated iterations of the estimates
- Applications available include:
 - *Crystal Ball* from Oracle (uses MS Excel)
 - *@Risk* (available for both MS Project and MS Excel)

Monte Carlo Simulation

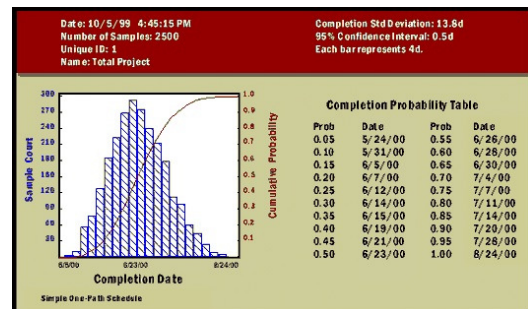


"Probability distribution" of the sum of two [die](#)

Outcomes:

- 1 two
- 3 threes
- 3 fours
- 3 fives
- 6 sixes
- 6 sevens
- 5 eights
- 3 nines
- 1 ten
- 3 elevens
- 2 twelves

Monte Carlo Simulation



Crystal Ball [example](#).

Standard Networks & Templates

- Many common attributes between projects
- Allowing organisation to re-use standard project plans/networks and modify
- Template: saved versions of plan/network
- Standard plans can be stored in "libraries" with record of contents and type of project
- Make sure not to overwrite the template
- Task/Activity identifier needs to reflect name of project

Summary

- Large networks can cause difficulties in PM but may be overcome using Rolling Wave Plan, filtering & sorting and breakdown of networks
- Quantitative risk analysis, using three possible durations, can be performed with both PERT & Monte Carlo techniques
- Standard networks can be saved as templates and reused/modified to bring consistency and efficiency

Project Management Advanced Diploma

Computers & PM – Week 9

Josephine Coffey