Chapter 7

Tools and Techniques of Project Management
7.1 Risk management

Risk is the chance or probability of something that may or may not occur; it is something which can be quantified (using standard deviation).

Uncertainty is something, which cannot be predicted with statistical confidence, normally due to insufficient information.

In a project environment there is always a risk or chance that adverse conditions occur, which could cause the project to fail, or fail to meet its planned objectives e.g. time, cost and quality. A project manager or a project board should consider the different tasks, activities and work to accomplish project deliverables, and consider any risk that an actual outcome could differ to an expected outcome. The financial and non-financial effects of each risk should be well documented, each risk perhaps classified into groups for better understanding of its implications. Models such as PEST or SLEPT analysis and other derivatives help to analyse different types of risk e.g. social, legal, economic, political and technological risk. Risk management processes can also help to identify those risks that are controllable and uncontrollable, once each risk has been identified and the scale or impact of each clearly understood, appropriate risk management strategies can be implemented in order to control each risk. This will be an on-going activity throughout the various stages of the project.

A process of managing risk

1. Risk committee set up to address risk issues identified e.g. regular risk audits, to identify and estimate the likelihood and consequences.

2. Risk register kept which documents:
   - All identified risks ranked and prioritised
   - Significance and consequence of each risk reported.
   - Assigned responsibilities to individuals to manage different risks identified e.g. for greater accountability.
   - Documentation of measures and actions to be taken for each risk, in the event that it does occur e.g. risk management strategies.

3. Existing processes for risk management reviewed and refined over time e.g. continuous improvement.
Risk management strategies

- **Retain the risk** (Absorption) e.g. if the risk is small and won’t affect the project a great deal then do very little and live with it.
- **Avoid the risk** (Avoidance) e.g. take action to ensure the risk is prevented or avoided in some way e.g. contract clauses, abort contract etc., but this will cost money and some risks are unavoidable, therefore avoidance may not be feasible.
- **Reduce the risk** (Reduction) e.g. ensure a risk is minimised by effective control systems such as, employment agencies to supply staff ‘temps’ in the event that progress falls below what expected.
- **Transfer the risk** (Transference) e.g. pass or transfer the risk to a third party, an underwriter or insurer therefore bears the risk, however this could cost allot of money.
- **Contain the risk** (Containment) e.g. immediate action taken to safeguard any unwanted occurrence, such as more than enough funding or staff made available to prevent the situation occurring, or two alternative suppliers on stand by just in case. Contain means to control, lessen the intensity or hold in restraint, very similar to risk reduction.

**Scenario planning** is about perceiving uncertainties e.g. identification of risks and the development of pre-emptive courses of action, if the event or scenario was to occur. It is an attempt to build plausible views of a number of different possible futures for when operating in conditions of high uncertainty. Scenario planning is a powerful business tool. Scenario planning is not about predicting the future but exploring the future. If management can be more aware of what could happen, they are more likely to be able to deal with it if it does. Using scenario planning can equip management to think constructively about the future and to plan for it more precisely. It is about setting up systems for monitoring what actually does happen in such a way that management are able to appreciate and respond effectively to changes that may evolve over time.

**Buffering (or slack)** is the allowance of extra cost, time or resources e.g. just in case certain events or risks do occur. Buffering makes a provision for uncertainty in project environments.

**Example 7.1**

Give examples of some risks identified for a project to introduce a new computerised system?
7.2 The budgeting process

A budget is a forecast or quantified plan of action. A quantified financial plan of action which itemises a project’s income and expenditure allocated e.g. a list of all planned income and expenses. Budgetary planning creates a budget as part of the planning process for the project. Budgetary control compares the budgeted results as a ‘yardstick’ or target, in comparison to actual results, in order to quantify any variances or deviations from the project plan. This process at regular intervals throughout a project can be used to take control action and bring actual results in line with the plans.

Budgets may help in authorising expenditure, communicating objectives and plans, controlling operations, coordinating activities, evaluating performance, planning and rewarding performance.

Often reward systems involve comparison of actual with budgeted performance. (CIMA)

The process of producing budgets

- A budget manual is prepared to give instructions, reporting lines, delegate responsibilities, communicate the timetabling and deadlines for submission of the different budgets.
- A budget committee may be formed to coordinate and administrate the process of producing the different budgets. Budget committees help centrally control the process of budgets being produced, they will communicate with other departments to coordinate and consolidate the production of different budgets to be prepared.
- A budget officer (accountant) will often be appointed to assist the budget committee.

The purpose of budgets

P  Planning
R  Resource utilisation (or responsibility accounting)
I  Integration or coordination
M  Motivation
E  Evaluation
Example 7.2

Project budgets can be imposed using top-down (centralised) approaches e.g. project board sets the budget, or using bottom-up (decentralised) approaches e.g. project manager or project team sets the budget.

What are the advantages and disadvantages of each?
7.3 Work breakdown structure (WBS)

The purpose of work breakdown structure (WBS) is to help plan effectively for a project by breaking key tasks or activities down into more manageable and smaller units of work.

WBS produces a detailed list of tasks to be performed for a project, helping to deliver better costing, scheduling and resource planning for a project.

Cost breakdown structure (CBS) lists every item classified and its expenditure for the project in order to get a more detailed estimate of cost or expenditure.

Examples of how WBS or CBS can aid budgeting planning

- Staff hours for each task or activity assigned x staff hourly rates per hour
- Staff hours for each task or activity assigned x overhead rates per hour
- Equipment, financing or resources more accurately planned for given more detail of the tasks to undertake

During a project, financial control can be achieved by actual expenditure being tracked against each budget allocated for the different tasks assigned. Regular progress can be monitored using budget or time sheets, and control action taken if appropriate e.g. the process of exception reporting.

The benefits of using WBS

- Can be used to allocate and delegate responsibility to help accomplish different tasks or activities e.g. control through greater accountability.
- Can help sequence and schedule the timing of different events to improve effectiveness of how time is allocated e.g. the most efficient sequence of accomplishing activities can be understood.
- Improves resource planning and the efficiency of how resources are consumed e.g. accurate forecasts for project staffing to save cost.
- Can be used as a basis of financial exception reporting e.g. actual v budget cost allowances, and also forecast more accurately the project costs.
- Can be used for risk management e.g. to identify risks, and used as an ongoing process for monitoring risks for a project.
### 7.4 Gantt Charts

A time chart devised by Henry Gantt in 1917, an American engineer. A Gantt chart is a horizontal bar chart used for project scheduling. Each activity or task is depicted as a block over time, actual performance is recorded in real time and compared to planned deadlines necessary for achieving completion.

#### The use of Gantt Charts as a tool

- Can be used to plan time scale for a project
- Can be used to estimate resources required
- Graphical illustration of a schedule of tasks to complete e.g. ideal wall chart for the office and easy to visualise and interpret at meetings
- Helps to plan, coordinate, and track specific tasks for a project
- Good for small projects when the number of tasks or activities are small and not complex e.g. good for simple projects.

The example of a Gantt chart below illustrates the start date, end date and duration of each task, the illustration is for an IT project. The arrow indicates in real time that the project is at the beginning of week 18. No actual time bar has been completed for the last 3 activities because they have not started yet. Often communication can be improved by omitting different time lines e.g. between week 5-12 has been omitted, to reduce the length of the chart. This is only possible if you have no activities starting or completing during any time discontinuance(s) you present.

#### Illustration of a Gantt chart

<table>
<thead>
<tr>
<th>Week number</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>18</th>
<th>19</th>
<th>20</th>
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<td>Integration</td>
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<td>Plan</td>
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<td>Actual</td>
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7.5 Critical path analysis (CPA) or network analysis

Gantt charts are a poor time management tools when projects are lengthy and complex. There often exists in large projects a high interdependency between various tasks e.g. some activities cannot start, until others have been completed first, therefore many activities are interrelated. Gantt charts in these circumstances are less desirable because they do not display or indicate interdependencies. Network (or critical path) analysis can display more logically the sequence and timing of each activity, they communicate interdependency and a more effective time management tool for large and complex projects.

The use of critical path analysis as a tool

- Good visual communication and planning tool for effective time management.
- Displays clearly interdependent relationships that exist between the different activities or tasks to be completed.
- Arranges tasks or activities into an optimum sequence of events allowing a project to be completed in the most efficient time possible.
- Elapsed time (or estimated time) to complete the project can be calculated.
- Highlights those activities which are 'critical activities' e.g. those tasks which must be completed within their planned time, otherwise the elapsed time (or estimated time) of the project will not be achieved.
- Enables more effective resource planning, resources can be diverted away from 'non-critical' to 'critical activities' e.g. staff could be moved from one task to another, should problems of overrunning occur on critical activities. This does assume that resources moved are directly substitutable between tasks.
- Highlights 'float times' for all activities e.g. the amount of time an activity or task can slip past its planned completion time, without delaying the elapsed time (or estimated time) of the project. All critical activities have a float time of zero, because each must be completed within their planned completion time, otherwise the elapsed time of the project won't be achieved.

Process of critical path analysis

1. Break down project into a logical sequence of activities to be completed.
2. Estimate the time duration of each activity.
3. Arrange activities in the most efficient sequence of events and estimate the elapsed time of the project
PERT (Project Evaluation and Review Techniques)

The technique of PERT helps give better time estimation for a project, by accounting for the uncertainty when predicting task durations. As an illustration, the project manager could estimate the worse, best and most probable duration of time for each activity and then determine an 'average' completion time. This can be undertaken by assigning probabilities to the three estimates and calculating an 'expected value'. The average time of each activity would then be used to configure the elapsed time of the project.

Advantages of critical path analysis (CPA)

- Identifies interrelationships between different tasks or activities
- Resources can be planned and allocated from using it e.g. staff planning
- Good communication and planning tool for time management

Disadvantages of critical path analysis (CPA)

- Assumes a trade off between time and money but most staff cost could be a fixed not variable cost
- The complexity of the diagram will increase as more activities are included
- Key uncertainties often exist when estimating the duration for activities, therefore can be a poor prediction for elapsed time.
Symbols used to create a network diagram

An arrow is used to represent each activity or task to accomplish, the letter above the arrow represents the activity in shorthand and the duration of the activity is recorded below the arrow e.g. hours, days or months.

Each activity or task that happens, has a preceding event (circle) and each circle is pre-numbered e.g. above circle 5 is used as an example to show this would be the 5th event or circle to be completed in the diagram.

The earliest event time (EET) for an activity is recorded in the circle preceding each activity (represented by an arrow) as you work from left to right. The EET displays the earliest time an activity (represented by an arrow) can start, given the interdependence of other activities that would be completed beforehand.

The latest event time (LET) for an activity is recorded in the circle following the activity (arrow) e.g. the latest time an activity must be completed by, in order to achieve the elapsed time of the project.

A dummy event (or activity) is used when a task or activity (represented by an arrow) follows more than one preceding activity e.g. the arrow could be drawn from more than one potential circle in the diagram. If an activity relies on more than one activity to be completed beforehand, draw the activity (arrow) from the circle with the highest earliest event time (to preserve the diagrams logic), then link all possible circles together, that the activity could have been linked to by using dummy activities e.g. a broken or dotted arrow. This enables understanding that an activity relies on more than one task to be completed beforehand, before it can actually start itself, therefore this displays better logic.
How to construct a network (critical path) diagram

- Requires a pencil, ruler and 2p coin (or any stencil or coin for a perfect circle!)
- Drawn from left to right e.g. A4 page landscape better than portrait
- Tasks or activities (represented by arrows) will always have one starting circle (before the arrow) and one finishing circle (after the arrow)
- Numerically label circles displayed e.g. circle 1, 2, 3 etc
- No crossing of lines to avoid poor communication
- Complete the earliest event time for each activity, within the preceding circle, to each activity, whilst completing the diagram, working from left to right
- Numerically label circles for each one displayed e.g. circle 1, 2, 3 etc
- Complete the latest event time for each activity within the succeeding (or following) circle to each activity. The LET cannot be identified until you have determined the elapsed time of the project first, therefore the recording of latest event times, would be the last thing you do to complete the diagram. Work from right to left within the diagram to calculate each activities latest event times (LET)
Example 1

<table>
<thead>
<tr>
<th>Activity</th>
<th>Duration (Wks)</th>
<th>Preceded by</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>B</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>C</td>
<td>3</td>
<td>B</td>
</tr>
</tbody>
</table>

Each activity is denoted by a letter and the expected duration given. A and B could start immediately, therefore can start on the same circle. C must be preceded by B e.g. C cannot start until B has been completed.

Network (critical path) diagram

- The elapsed (expected completion) time of the project is 7 weeks
- The critical path activities are B and C e.g. both must be completed within their predicted durations, otherwise the project will be longer in duration than 7 weeks.
- Activity A is a non-critical activity and would have a float time of 2 weeks, this is because it only takes 5 weeks to complete, has nothing preceding or succeeding it, therefore given the elapsed time of the project is 7 weeks, it could finish as late as this.
Example 2

<table>
<thead>
<tr>
<th>Activity</th>
<th>Duration (Wks)</th>
<th>Preceded by</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>B</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>C</td>
<td>3</td>
<td>A, B</td>
</tr>
</tbody>
</table>

Similar information to example 1 but an entirely different result below. This is due to activity C being dependent on A and B finishing before activity C can start (not just activity B as before in example 1). Whenever you see an activity with more than one preceding activity, a dummy activity (broken arrow) will be required to preserve logic within the diagram.

Diagram

- The elapsed (expected completion) time of the project is 8 weeks
- The critical path activities are A and C e.g. both must be completed within their predicted durations, otherwise the project will be longer in duration than 8 weeks. Notice how the EET and LET of critical activities are identical.
- Activity B is a non-critical activity and would have a 'float time' of 1 week. This is because its predicted duration is 4 weeks, but it can take 5 weeks to complete and still leave enough time left for activity C to be completed, the elapsed time of the project will still be achieved. Notice how the EET and LET of non-critical activities are different, the difference is 1 week e.g. the float time, when you deduct one from the other.
- The broken arrow (or dummy activity) preserves logic within the diagram e.g. visually you can see that both activities A and B must be completed, before C can start. Notice also that the arrow representing activity C starts from circle 3 (not circle 2), this is because the earliest event time for C would be 5 weeks not 4 weeks as circle 2 displays.
Example 7.3

<table>
<thead>
<tr>
<th>Activity</th>
<th>Duration (Wks)</th>
<th>Preceded by</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>B</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td>C</td>
<td>2</td>
<td>A, B</td>
</tr>
<tr>
<td>D</td>
<td>1</td>
<td>C</td>
</tr>
<tr>
<td>E</td>
<td>3</td>
<td>C</td>
</tr>
<tr>
<td>F</td>
<td>4</td>
<td>C</td>
</tr>
<tr>
<td>G</td>
<td>5</td>
<td>D, E, F</td>
</tr>
</tbody>
</table>

Identify the critical path activities above and state what the elapsed time of the project would be? How many weeks can activity D over run by without effecting the elapsed time of the project?
Example 7.4

<table>
<thead>
<tr>
<th>Activity</th>
<th>Duration (Wks)</th>
<th>Preceded by</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>B</td>
<td>4</td>
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<tr>
<td>C</td>
<td>2</td>
<td>A, B</td>
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<td>D</td>
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<td>C</td>
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<tr>
<td>E</td>
<td>7</td>
<td>D</td>
</tr>
<tr>
<td>F</td>
<td>3</td>
<td>E</td>
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<tr>
<td>G</td>
<td>1</td>
<td>F</td>
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<td>H</td>
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<td>I</td>
<td>4</td>
<td>G</td>
</tr>
<tr>
<td>J</td>
<td>1</td>
<td>H, I</td>
</tr>
</tbody>
</table>

Identify the critical path activities above and state what the elapsed time of the project would be? How many weeks can activity H over run by without effecting the elapsed time of the project?
7.6 Resource histograms

A resource histogram is a column (or bar) chart that shows the number of resources assigned to a project over time. Resource histograms normally presented as bar charts, can be an effective tool for resource planning and coordinating project staff.

Illustration of a histogram

Project H requires the following types of staff over the next 5 days

<table>
<thead>
<tr>
<th>Staff type and number required</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
<th>Day 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyst</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Programmer</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
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</tr>
<tr>
<td>Total</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

Resource histogram e.g. component bar chart

Staff required
7.7 Gates and milestones

Milestones are a completion of major interim goals for a project e.g. the key stages of a project from initiation to closure.

Gates are significant events or major objectives that have been accomplished at various stages of a project. They assess the key completion or quality of work achieved. Gates are smaller milestones, but well defined into the project management process, a firm deliverable that can be realised and achieved.

The problem of following gates or milestones, unlike driving from one place to another, is that the project road signs are not that clear and often can move.

7.8 Reports

A project initiation document (PID) (project proposal document or charter) is a report to justify a business case for a project, detailing the justification for undertaking, it and for continuation of it. A PID is used to define the financial and other benefits which the project is expected to deliver. It also details the cost, timescale and other constraints within which the project is required to operate and against which performance will be evaluated.

Contents of a PID

- Terms of reference e.g. the purpose of the report
- Scope and goals of the project
- Organisational team structure required and reporting procedures
- Cost estimates
- Time estimates
- Overview of any risks of the project
- Views of stakeholders to be sought and consulted with

A project planning document (PPD) will normally consist of a project technical and resource plan at the beginning of a project and used as a reference tool throughout the project.

Contents of a PPD

- Project resource plans
- Quality policies and quality control procedures
- The terms of reference e.g. definition of projects purpose, scope and objectives with any relevant background information
- Network (critical path) analysis e.g. time estimates and elapsed time identified
- Work breakdown structure and forecasts for expenditure
- Risk analysis undertaken and recommendations
- Timetable for meetings and deadlines
- Organisational team structure and contacts
**Progress (or exception reports)** can be used to monitor and control the project. This allows the project board or project manager to identify cost, scheduling or quality related problems earlier, and view the current status of progress.

- Actual time compared with plan and material exceptions summarised
- Actual cost compared with plan and material exceptions summarised
- Actual quality compared with plan and material exceptions summarised

The **post completion (PC) report** would be produced at the closing or completion stage of a project. This report will summarise project results achieved and used for the purpose of terminating or signing off the project.

**Contents of a PC report**

- Results documented from staff appraisals undertaken
- Stakeholder marketing and surveys undertaken e.g. client
- Post completion audit and report e.g. post project review of time cost and quality
- Recommendations for dying up loose ends
- Recommendations for improving future project management
- A section for the acceptance of project deliverables by the customer
- A section for the official close down and end to the project

**Post completion (PC) review and audit**

A post completion review and audit will examine the lessons to be learned and help deal with such matters as client expectations, any management problems encountered or any exceptions to project objectives. A PC report also enables mistakes of management to be learned from.

**Techniques used for a PC review**

- End user satisfaction surveys about the quality of the product delivered
- Appraisals of management and staff
- Exception reports of costs to budget for different activities
- Exception reports of actual time to budget for different activities
- Testing reports e.g. efficiency, performance or quality

**The purpose of a PC review**

- Support continuous improvement e.g. review procedures to design better ones
- Identification and implementation of any post completion corrective action
7.9 Project management software

Project management software on the market today includes Lotus Notes / Domino or Microsoft Outlook / Exchange. These fairly comprehensive and integrated packages provide project applications for timesheets, expense reports, resource management, job costing, help desk services, time reporting and much more.

Benefits of project management (PM) software

- **Project scheduling.** Project software can help automatically produce critical path diagrams or Gantt charts. The software can also instantly update these time plans when new information is entered and produce automatic exception reports to monitor and control the project e.g. actual vs budgeted time.

- **Budgeting and controlling cost.** Project software will help plan and control project expenditure more effectively and improve communication of financial reporting. After budgeted data has been input, actual costs and estimated costs to complete the project can be tracked, any material exceptions instantly reported e.g. actual vs budget expenditure.

- **Communication and coordination.** Project software can provide automatic report templates with good graphical features, these help to provide effective information and communicate to various stakeholders of a project. Real-time calendars, diaries and reminders can also help coordinate meetings more effectively.

- **Work breakdown structure.** Project software can help assist with planning and coordination of project staff by breaking tasks or activities down into more manageable and smaller units of work or activities to be completed. Automatic schedules of work can be printed off and used to delegate tasks to different staff within the project team.

- **Risk management.** Project software will help manage the sheer complexity of managing funds, equipment, staff and other stakeholders to achieve project objectives. Good for ‘What if’ analysis, the project manager can change different variables e.g. the duration of activities or cost allowances, in order to understand any fundamental impact this would have on the project.

- **Greater accuracy and ease of updating and reprinting reports.** Improves the efficiency of how data is gathered, summarised and communicated.
7.10 Project management systems

Every project should have a plan and a set of objective or performance measures to achieve it. Control is needed to ensure what is intended actually comes to be. The aim of a good control system is to ensure that the right things get done, so there has to be some kind of plan, standard, budget, rule book, instructions or any other target to adhere to. Control is dependent on the receipt and processing of effective information, consistent and standardised filing, administration and controls can all ensure an effective system.

Conformance management systems

Ensures the output of the project e.g. the end product or result, meets the customers technical or functional specification and requirements. For example within construction this could be controls over quality assurance for construction work undertaken and regular inspection through to completion. Conformance systems ensure that end user satisfaction is achieved.

Examples

- Staff training
- Clear instructions communicated
- Regular inspection, testing and reporting
- Quality standards for materials and other resources used
- Quality assurance contracts with suppliers

Performance management systems

A measurement process of regularly assessing a projects progress against pre-defined outcomes e.g. time, cost and quality. Performance is about accomplishment of work assignments and includes the assessment of behaviour demonstrated by an individuals approach to completing work.

- Establish key project objectives e.g. cost, schedule and end user satisfaction
- Establish systems for collecting, measuring and analysing performance
- Focus on achieving results
- Clear lines of authority and methods of reporting established
7.11 Earned Value Management (EVM)

Earned Value Management (EVM) is a project management system that combines schedule and cost performance to answer the key question, “What did we get for our money spent?” EVM is a measurable performance system which provides quantitative data for project decision making and control, it is a systematic project management process used to identify project variances or ‘exceptions’ by the comparison of worked performed and work planned. It is a measurable system for project scope, scheduling and cost in a single integrated system, providing an early warning for performance problems.

**Essential features of EVM systems**

1. A quantified project plan that identifies work or tasks to be accomplished.
2. A valuation of planned work, or tasks to be accomplished e.g. the Planned Value (PV) or Budgeted Cost of Work Scheduled (BCWS).
3. Pre-defined metrics e.g. ‘cost drivers’ and ‘overhead rates’ to quantify the actual accomplishment of work e.g. Earned Value (EV) or Budgeted Cost of Work Performed (BCWP).
4. The different project activities or tasks accomplished ‘earn’ value as they are being completed, this ‘Earned Value’ (EV) is compared to planned costs (Planned value) to determine project performance and trends.
Key summary of chapter

Managing risk

1. Risk committee
2. Risk register
   - All identified risks ranked and prioritised.
   - Significance and consequence reported.
   - Assign responsibilities to manage.
   - Measures and actions recommended.
3. Risk management strategies
   - Retain the risk (Absorption) 'do very little and live with it'
   - Avoid the risk 'but some risks are unavoidable'
   - Reduce the risk 'minimised by effective control'
   - Transfer the risk 'transfer risk to an underwriter'
   - Contain the risk 'immediate action to safeguard'

Scenario planning
An attempt to build plausible views of a number of different possible futures for when operating in conditions of high uncertainty. Scenario planning is not about predicting the future but exploring the future. If management can be more aware of what could happen, they are more likely to be able to deal with it if it does.

Buffering (or slack)
The allowance of 'extra' cost, time or resources e.g. 'just in case' certain events or risks do occur.

Budgets
Budgets may help in authorising expenditure, communicating objectives and plans, controlling operations, coordinating activities, evaluating performance, planning and rewarding performance.
Often reward systems involve comparison of actual with budgeted performance.
(CIMA)
Work breakdown structure (WBS)
The purpose of work breakdown structure (WBS) is to help plan effectively for a project by breaking key tasks or activities down into more manageable and smaller units of work.

Cost breakdown structure (CBS)
Lists every item classified and its expenditure for the project, in order to get a more detailed estimate.

Gantt charts
A horizontal bar chart used in project scheduling. Each activity or task is depicted as a block over time, actual performance is recorded in real time and compared to planned deadlines necessary for completion.

Critical path (network) analysis
Visual tool for effective time management and displays clearly interdependent relationships that exist between activities. Arranges tasks or activities into an optimum sequence of events allowing a project to be completed in the most efficient time possible.

How to construct a network (critical path) diagram
- Requires a pencil, ruler and 2p coin
- Drawn from left to right and 'landscape' better than 'portrait'
- Tasks or activities (represented by arrows) will always have one starting circle (before the arrow) and one finishing circle (after the arrow)
- No 'crossing of lines' to avoid poor communication
- Complete the earliest event time for each activity, within their preceding circle, whilst completing the diagram, working from left to right
- Numerically label circles displayed e.g. circle 1, 2, 3 etc
- Complete the latest event time for each activity within the succeeding (or following) circle. The LET cannot be identified until you have determined the elapsed time of the project first, therefore the recording of latest event times, would be the last thing you would do to complete the diagram. Work now from right to left within the diagram to do this.

A dummy event (or activity) is used when a task or activity follows more than one preceding activity e.g. the arrow could be drawn from more than one potential circle in the diagram. To preserve the diagrams logic: draw activities from the circle with the highest earliest event time, then link all possible circles together, that the activity could have been linked to, by using dummy activities e.g. a broken or dotted arrow.
Critical path (network) analysis (terminology)

- **Elapsed time** is the estimated time to complete the project.
- **Critical activities** are tasks which must be completed within their planned duration or otherwise the project will not achieve its elapsed time.
- A **float time** is the amount of time an activity or task can slip past its planned duration, without delaying the elapsed time of the project e.g. any allowable delay. Float times are only relevant to non-critical activities because all critical activities have a float time of zero. Deducing the LET from EET can derive float times for each activity.
- The **earliest event time** (EET) for an activity is the earliest time it can start, given the interdependence of other activities that must precede it.
- The **latest event time** (LET) for an activity is the latest time it must be completed by, given what must succeed or follow it, to achieve the elapsed time of the project.
- **PERT (Project Evaluation and Review Techniques)** can give better time estimation for a project, by accounting for uncertainty when predicting each task duration. An 'average' time for each activity can be used to configure the elapsed time of the project, calculated from a 'worse' case, 'best' case and 'expected' case scenario.

Resource histograms

A resource histogram is a column (or bar) chart that shows the number of resources assigned to a project over time. Resource histograms normally presented as bar charts, can be an effective tool for resource planning and coordinating project staff.

Milestones

The completion of major interim goals.

Gates

A smaller milestone, but well defined into the project management process.
Project management software

Project management software on the market today includes Lotus Notes / Domino or Microsoft Outlook / Exchange. These fairly comprehensive and integrated packages provide project applications for timesheets, expense reports, resource management, job costing, help desk services, time reporting and much more.

PM software

- Project scheduling.
- Budgeting
- Communication
- Work breakdown structure
- Risk management
- Reporting
- Faster update of information
- Greater accuracy of information

Project reports

<table>
<thead>
<tr>
<th>The project life cycle</th>
<th>Identification of need</th>
<th>Development of a solution</th>
<th>Perform the project</th>
<th>Terminate the project</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Define</td>
<td>Plan</td>
<td>Implement</td>
<td>Control</td>
</tr>
<tr>
<td></td>
<td>What</td>
<td>How</td>
<td>Do</td>
<td>Check</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Reports</th>
<th>Project Initiation Document PID</th>
<th>Project Planning Document (PPD)</th>
<th>Progress (exception) reporting e.g. actual v budget</th>
<th>Post completion (PC) audit report</th>
</tr>
</thead>
</table>
**Conformance management systems**

Ensures the output of the project meets the customers technical or functional specification and requirements.

**Performance management systems**

A measurement process of regularly assessing a projects progress against pre-defined outcomes e.g. time, cost and quality.

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**Earned Value Management (EVM)**

It is a measurable system for project scope, scheduling and cost in a single integrated system, providing an early warning for performance problems.

**Essential features of EVM**

- A quantified project plan
- A valuation of planned work to be accomplished (planned value)
- Pre-defined metrics to quantify the actual accomplishment of work (earned value)
- Earned ValueÔ (EV) of activities as they are completed are compared to planned cost (Planned value) to determine performance and trends.
Further question practice

Question 1 (CIMA P5 Pilot paper 2005)

The WAM Organisation is one of the most successful supermarket chains in its own country. Its reputation for innovation is unparalleled in its own country with the successful launch of its personal finance, telecom, and internet shopping services.

The WAM Organisation's customer focus and its ability to provide value for money through efficient operations and the use of the latest technology has enabled it to gain the largest share of the market.

Following a careful process of internal and external analysis, the senior management of WAM Organisation has concluded that the domestic market for its goods and services has reached saturation point and that the only opportunity for significant growth lies in venturing abroad.

Acting partly on the advice of the central government’s Overseas Advisory Board, and using its own research team, WAM Organisation’s management has decided to locate its first overseas supermarket in country Y. The location selected is in the suburbs of a growing city, where groceries, clothing and the other non-food products that WAM Organisation intends to supply are currently provided by a large number of small shops.

The new overseas outlet will be staffed initially by managers from WAM Organisation’s home country, but other staff will be recruited and trained in country Y. The company has also made it clear that its human resource policy is to provide management opportunities to local people once the business in country Y is established.

The manager for the overall project is Ms D from WAM Organisation’s Business Development division, while the project manager for the construction of the buildings, roads and car park that will make up the supermarket outlet is Mr G from the WAM Organisation’s Property and Estates division.

The land on which the supermarket outlet will be built has been purchased and following a series of tough negotiations with state and local government officials, planning permission has been granted. Vigorous protest, however, has come from the City’s Civic Society, local residents and shopkeepers who are located near to the proposed development.

The Civic Society is concerned about the detrimental impact on the local environment. Residents are concerned about the potential increase in traffic and the danger it poses to the children in the local school. The shopkeepers are fearful about the impact of the new supermarket on their future business prospects.

The media, including television, radio and newspapers have publicised the fears of the local residents and shopkeepers and these two groups, together with the City’s Civic Society, have formed a coalition to attempt to prevent the development.
**Required:**

(a) Identify the secondary stakeholders in the WAM Organisation’s supermarket project and explain how the project team should manage these stakeholders.

(15 marks)

(b) Identify the major risks associated with the WAM Organisation’s development project.

(15 marks)

**Question 2 (CIMA P5 May 2005)**

R has taken on the responsibility for organising the annual conference for the local Society of Management Accountants. Remembering the project management techniques she came across when studying for her professional qualification, R has decided that critical path analysis may be helpful in planning the conference.

As a start, R has drawn up a list of the activities she must complete in preparation for the conference, she has identified the dependency between the different activities and the time she thinks each will take.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Dependency</th>
<th>Time (weeks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determine conference theme</td>
<td>A</td>
<td>3</td>
</tr>
<tr>
<td>Research alternative venues</td>
<td>B</td>
<td>6</td>
</tr>
<tr>
<td>Identify and book guest speakers</td>
<td>C</td>
<td>A</td>
</tr>
<tr>
<td>Book venue</td>
<td>D</td>
<td>B</td>
</tr>
<tr>
<td>Print conference papers</td>
<td>E</td>
<td>C</td>
</tr>
<tr>
<td>Print and send out invitations</td>
<td>F</td>
<td>D</td>
</tr>
<tr>
<td>Confirm final arrangements with venue and deliver documents</td>
<td>G</td>
<td>E, F</td>
</tr>
</tbody>
</table>

**Required:**

Using the information from the scenario, construct a network diagram and explain how information from this could be useful to R in planning the conference.

(10 marks)
Question 3 (CIMA P5 November 2006)

It is often claimed that all project management is risk management since risk is an inherent and inevitable characteristic of most projects. The aim of the project manager is to combat the various hazards to which a project may be exposed.

**Required:**

Explain the concept of risk and the ways in which risk can be managed in a project.

(10 marks)

Question 4 (CIMA P5 November 2006)

As part of M University’s ambitious strategy for growth, investment is being made in the development of a student village.

The finance director of M University has been appointed as the project manager and is in the early stages of setting up the project. This will be a complex project involving the construction of new buildings to provide for the growth in student numbers, including living accommodation for students, teaching rooms, a state-of-the-art business and conference facility aimed at attracting corporate clients to work with the University, and sports and recreation facilities. The build will be a collaborative venture funded by the University and investments from two local businesses.

The regional authority currently owns the land that the University wants to acquire to build the student village. The authority, the members of which are directly elected by local residents, makes the decisions on whether to accept or reject planning proposals made. It was recently reported in the local paper that the local residents are unhappy about the proposal.

The development will mean that staff from two University departments will be relocated to the new site which is two miles away from the main campus. In the first open meeting held by the finance director to communicate the proposals, he was met with a hostile reaction from staff, with most of them being very unhappy about moving to the new site.

The finance director knows that this will be a complex project to manage and that project management software will be essential in making his job objectives achievable. He is also aware that the project has a number of different stakeholders that he must consider in putting together the project plan.

**Required:**

Discuss how project management software might help the finance director and his team successfully carry out the project.

(15 marks)
Question 5 (CIMA P5 Pilot paper 2005)

E, a management accountant, and three of her colleagues have decided to venture into
the buy-to-rent market. Recently, they set up a company, Enterprise Associates, and
purchased a house in which they would each hold a share. E inherited some money
and holds a 50% share. The other 50% is divided equally between the three other
partners. E, however, will take on much of the responsibility for the company’s first
venture and she has been given a free hand to develop the property as she thinks fit.

The house purchased by the colleagues is 150 years old and has been poorly
maintained. The interior fixtures, fittings and decor are also old fashioned. A survey
of the house also reveals that the electric wiring and water piping do not conform to
modern standards and that the walls are subject to rising damp. Without extensive
repairs and renovation the house would be almost impossible to rent. With interest
rates at an all time low and the demand for rented accommodation at a very high
level, E has decided, in consultation with her partners, to renovate the house before
offering it for rent.

The easiest option for E would be to employ a builder to carry out all the renovations
at an agreed price. After obtaining a number of estimates, however, she decides that
she and her husband can carry out some of the basic repairs and manage the
decorating themselves at a considerable saving.

E realises that this will make considerable demands on her time and that careful
planning will be necessary to fit the work on the house with her demanding job as a
management accountant, as well as fulfil her family obligations. Conscious of the
need to maintain the quality of her work, E has decided, with the agreement of her
employer, to work part-time for the duration of the house project, but she recognises
that even with this change she will have to manage her time very carefully.

On this basis, E has agreed with her partners in Enterprise Associates a profit sharing
ratio of 70 : 10: 10 : 10 with all expenses for materials and specialist labour shared
equally between the four.

As well as being methodical and hard working, E has developed a number of practical
skills over the years while improving the family home. Hence many of the decorating
tasks are familiar to her. If E has a weakness, it is that she enjoys conversation and
meeting people and often takes more time than is necessary to conduct business and
social transactions.

The damp proofing, wiring and plumbing will need to be carried out by skilled
specialists but E already has contacts with an electrician and a plumber (fitter of water
pipes), and they, in turn have contacts with other specialists in the building trade such
as carpenters (wood workers) and plasterers (who specialise in covering walls with a
skimming of plaster.)

Although she has no experience of house renovation on this scale, E has a rough idea
of the sequence in which the various jobs – damp proofing, plumbing and so on will
need to be carried out and has received advice from a builder on the estimated time
that each job will take to complete. She has also contacted the various skilled specialists for estimates of the cost for each job.

This information is most timely for E because she has just had a firm offer from a prospective tenant J, to rent the house, provided he and his family could move into the house in three months' time. E, knowing the family, and confident that they would be good tenants, has agreed that she will have the property ready for them in three months and available for rent at an agreed price.

While E naturally wishes to keep costs to a minimum, she also requires that the renovation meets quality standards acceptable to customers who wish to rent property.

**Required:**

Explain to E the benefits of using a Work Breakdown Structure in the planning of the project.

(10 marks)

**Question 6 (CIMA P5 May 2007)**

Over the years, D, an entrepreneur, has had a number of business successes in the retail sector. She is keen to move on to bigger things and has identified an opportunity to develop a Shopping Centre.

Having secured the interest of several potential investors, identified a suitable site, had an architect draw up plans and received planning permission, D is eager that construction work on the Shopping Centre should start as soon as possible. She appointed G, who has an impressive record of managing successful projects, to be project manager. However, D is already interfering in the management of the project and is in conflict with G. She is frustrated by the time G seems to need in the planning phase, and is irritated by his insistence on formalising the project management process. D is now putting pressure on G to miss out elements in the first stages of planning the project, and to get started on the construction work for the Shopping Centre.

**Required:**

Explain the contribution of different project management tools and techniques that could help G in planning the project.

(15 marks)
Question 7 (CIMA P5 November 2007)

X is the project manager responsible for the implementation of the new customer information database in Y Company. He was selected to take on the role of project manager because of his strong technical capability.

The project represents an important development and financial investment for Y Company. A number of different business areas in the company have interests in the project and are dependent on the new customer information database going live on the due date.

Unfortunately, the project is not going well and the project steering committee wants answers from X. He feels he is under pressure to keep on schedule but lacks the support of his project team, who keep complaining that they do not know what they are supposed to be doing. It would appear that some members of the project team are not completing tasks on time and are not providing the information needed to progress with the system development. At the same time, the project sponsor is pushing X to make short cuts to make sure the system goes live on time.

X feels that many of the problems he faces are due to lack of project controls.

**Required:**

(i) Discuss the purpose of project control.

*(4 marks)*

(ii) Explain the controls that should be set up for the customer information database project in order to help X manage the various stages of the project.

*(9 marks)*
Suggested solution to Question 1 Part (a) (CIMA P5 Pilot paper 2005)

Stakeholders are those organisations or people that have an interest in the WAM organisation, these interests being for many reasons. They can be a source of potential conflict for the successful accomplishment of project goals, so the essential skills of negotiation and communication are needed by the project team in order to resolve any conflicts that exist. Secondary stakeholders are those where an informal and no contractual relationship exists with the WAM organisation, as opposed to Primary stakeholders where a formal and contractual relationship exists with the organisation.

Identification of secondary stakeholders

- The overseas advisory board
- Local shop keepers in country Y
- State and local government officials in country Y
- Civic society and local residents in country Y
- The media

How the project team should manage these stakeholders

It would normally be impossible for a project manager to be committed to treating all stakeholders with equal respect, all stakeholders can be listened to, but at the same time it would very difficult to consider their views equally, after all not everyone can be pleased, the goals or personal objectives of stakeholders can enormously conflict.

One way of managing these stakeholders would be to prioritise by mapping which stakeholders should more likely be considered and satisfied by an organisation when strategic planning. Stakeholders can influence heavily the success or otherwise of a strategy adopted by the organisation. Overtime a certain stakeholder’s position may change once mapped and even though they may not have any power or any strong influence over what the organisation is doing at present, they could be able to exert influence over other more powerful stakeholders.

Stakeholders also when united collectively e.g. the coalition between local residents, shop keepers and civic society, can often exert a stronger influence over the organisation and the goals it therefore aims to achieve.

Mapping of stakeholders using Mendelow

- **Power** e.g. ability or right to exert influence over the organisations strategic direction it follows or the way it conducts itself
- **Interest** e.g. legitimate interest in the activities of the organisation or the way it conducts itself
Mendelow’s Matrix

<table>
<thead>
<tr>
<th>Power over your organisation</th>
<th>Interest in your organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Minimal Effort</td>
</tr>
<tr>
<td></td>
<td>Keep Informed</td>
</tr>
<tr>
<td>High</td>
<td>Keep Satisfied</td>
</tr>
<tr>
<td></td>
<td>Key players</td>
</tr>
</tbody>
</table>

From the use of Mendelow the process of stakeholder analysis can be undertaken by the WAM organisation as a way of managing these stakeholders.

1. Identify and classify stakeholders e.g. using a framework such as Mendelow
2. Analyse and understand the objectives and influence of different stakeholders and any relationships that exists between them
3. Prioritise stakeholders e.g. even key players on the basis of ranking, scoring or measures
4. Manage relations with the most important of them e.g. by consultation, participation and communication and the building of good relations through contact and education
5. Frequently undertake stakeholder analysis to keep pace with any changes e.g. the interest or influence of current or even new stakeholders

The coalition

Local residents, local shop keepers together with the Cities Civic Society have formed a group to attempt to prevent the new development. Individually these stakeholders are more a ‘Keep Informed’ group of stakeholders according to Mendelow, as these stakeholders are highly interested, but do not hold directly the power to withdraw planning permission. By acting collectively however you could argue they are ‘Key Players’. The groups main fears are that of the impact the new development will have on the local environment, the danger to children in the local school due to increased traffic and the prospect of the loss of business for existing shop keepers. These objections further strengthened by the weight of media pressure given to their cause.

It would be a good idea for the WAM organisations management to meet with these pressure groups, perhaps at a public place such as the town hall. These stakeholders should be allowed to publicly air their views and the management of WAM should as
much as possible listen and react to public opinion. Rearrangement of the design of the development could move traffic congestion potentially away from the local school or the movement to another site may reduce the impact on the local environment and prevent some loss of business for local shop keepers. The management of WAM can hopefully persuade this coalition of the benefits such as increased product choice or the local jobs and prosperity that such a development can provide. It would also be a good idea to have present local government officials in support of the WAM organisation.

The media

Adverse publicity if it continues will only strengthen the case of the coalition and ultimately could lead to state or local government actually withdrawing planning permission, a 'Keep Satisfied' stakeholder according to Mendelow. It would be a good idea for a representative from the WAM organisation e.g. a PR manager to present themselves as a media spokesperson and try and get some news coverage promoting the merits of the development, such as jobs created or the local management opportunities that such a development would bring to the local area, this could help simmer or change public opinion.

State or local government

This stakeholder would be a 'Key Player' according to Mendelow, due to the power it holds over the granting of planning permission, and a highly interested stakeholder due to the current lobbying and media coverage. It is important that good relations are maintained throughout the process with politicians or local government officials by the WAM organisation.

Solution to Question 1 Part (b) (CIMA P5 Pilot paper 2005)

SLEPT analysis, also referred to as PEST analysis, could be a good framework here in order to identify major risks with the new development project.

- S ocial
- L egal
- E conomic
- P olitical
- T echnological

Risk is when the actual outcome differs to the expected outcome. The WAM organisation is about to make a decision on which the outcome is not known with certainty, in this example entering a new market. In order to grow some risk has to be taken, but the key is management of the risk and the company’s attitude towards it e.g. risk averse or risk seekers.
Business risk

The volatility of profits caused by the nature and type of business operations that WAM is involved in e.g. the food industry and its life cycle or reactions of competitors that exist within country Y. This can also be the risk that new products will not be bought by customers or the risk that there is decline in sales of existing products e.g. the advent of cheap downloadable music from the internet has had an impact on the decline of CD sales in high street shops.

Trading risk

This includes credit risk (customers not paying) therefore the need to consider credit policy and how credit is offered. It is normal practice to offer credit facilities to customers, in the case of WAM through its personal finance services it may provide to customers in country Y. Trading risk can also extend to the physical risk of goods being stolen or lost in transit.

Cultural (or social) risk

Trading problems caused by different traditions or customs. There could be a risk of offending customers if these cultural differences are not addressed. HSBC renews itself to be a bank with detailed knowledge of local cultures and therefore delivers a product that is tailored to each overseas market. The WAM organisations oversight in terms of not addressing the different needs and wants of customers when it comes to stocking the right products for them or the way in which the products are presented in the supermarket, may well lead to lower sales and all due to a lack of understanding about different national tastes.

Political or legal risk

Risk that political action will affect the position and value of the overseas supermarket. Examples include exchange controls, tax regulations, restrictions on dividends and expropriation of assets. The risk that there is a change in the political position of a government and thus affecting the stability of a country. Given the current opposition by local residents, shopkeepers and Civic Society, there exists the possibility that state or local government may intervene and withdraw planning permission. It is also possible that the WAM organisation is unfamiliar with the laws that exist with country Y e.g. employment law or laws existing about health and safety.

Economic risk

The possibility of loss (or gain) exists due to future changes in exchange rates e.g. currency risk. The WAM Organisation is becoming more global and transactions may now occur in currencies which are different to their own home currency. Other types of economic risk include changes in unemployment, taxation, government spending, import and export trade, recession or boom. These may all have an impact on the future sales and profits that the WAM organisation earns overseas.

Risk analysis and assessment should be part of the evaluation of every major investment or acquisition by WAM. The project team should monitor risk and control
issues continuously. WAM should have a system in place to identify risks and this process should be carried out regularly as risks identified in the previously period may not necessarily be the same for the coming period. It would also be a good idea to employ a suitable agent within country Y who understands the countries laws, political state, economic climate and customers needs and wants more acutely than the WAM organisations own management team.

Solution to Question 2 (CIMA P5 May 2005)

The critical path activities for the organisation of the annual conference are A C E G. The non critical path activities are B D F. The elapsed time of the project 17 weeks.

**How the above information will be useful to R**

Network analysis presents visually the high interdependency that exists between the various tasks to be accomplished e.g. those which cannot start until others have been finished first. A network analysis can display and communicate clearly these relationships to R.

The network diagram has arranged the tasks or activities needed to organise the conference into an optimum sequence of events allowing R to complete the organisation of the conference in the most efficient time possible, in this case 17 weeks if her time estimations are correct.

The network diagram also highlights those activities which are critical, A C E G. These activities must start and be completed on time; otherwise the elapsed time of the project of 17 weeks will be longer in duration.

Resources could be allocated away from non-critical activities, B D F, such as staff hours, should problems of overrunning occur through the different stages of the project. As an example if activity C (identify and book guest speakers) is overrunning, to prevent the elapsed time of the project going beyond 17 weeks, staff from activity B (researchers for alternative venues) could be moved to activity C, this
assumes that resources used on the different activities are substitutable directly for one another. The diagram highlights the float times of B D and F allowing R to understand any flexibility she may have when doing this e.g. activity B has a float time of 3 weeks, which is good to know when managing the activity or diverting resources away from it.

The network diagram will be a good communication and planning tool for R when monitoring and controlling the conference project, very useful for effective time management.

**Solution to Question 3 (CIMA P5 November 2006)**

Risk is when an actual outcome could differ to an expected outcome. Many business decisions are made, by which the outcome is not known with certainty. Within a project environment, there is always a risk or chance that adverse conditions occur, which could cause the project to not meet its objectives of time, cost and quality. Once the objectives of a project have been identified then a risk assessment can be carried out. A risk assessment will identify and measure the impact of each risk. The assessment would consider internal factors e.g. staff quality, resources or funding available, and external factors e.g. economical, technological, or legal. This appraisal should also identify those risks that are controllable and those which are uncontrollable.

An organisation should have a system to establish and identify risks and this process should be undertaken regularly as risks identified in a previous period may not necessarily be the same for the coming period. The process of risk identification is not designed to eliminate the risks but to identify them and understand the significance of them. Sources of information to identify risks could come from external risk consultants, the project management and supervisors or even consultation with internal audit.

Once risks have been identified and the scale or impact of each risk understood, appropriate strategies should then be developed and implemented. Responsibilities should be allocated for accountability of managing risks and the situation should be monitored throughout the project.

- Risk committee set up to address issues identified.
- Risk register created which lists:
  - All identified risks.
  - Their significance and consequence.
  - Assigned responsibilities.
  - Measures taken to control them.

Possible strategies for response to risk could be as follows.

- Retain the risk e.g. if the risk is small and won’t affect the project a great deal then do very little and live with it.
- Avoid the risk e.g. take action to ensure a risk is avoided, but this will cost money and some risks maybe unavoidable.
- Reduce the risk e.g. ensure a risk is minimised by effective control systems.
• Transfer the risk e.g. pass the risk to third party, by imposition of contract terms or purchase of insurance, but this will cost money.

When managing and controlling risk, information must be collected and dispersed to the appropriate personnel so they can carry out their responsibilities within reasonable time. Both internal and external information is needed to make decisions and the quality of the information system used is paramount. Risks change and evolve over time and therefore the internal control systems must be reviewed for the effectiveness against risk on a regular on going basis. Monitoring should take place on a daily basis as part of normal activities, as well as internal audit carrying out timely reviews. The process used by the organisation should be reviewed and refined over time.

Solution to Question 4 (CIMA P5 November 2006)

The FD has the ultimate responsibility for ensuring the desired result is achieved, that is, the student village project is on time, within cost and meets the specified quality required. To manage this, resources such as staff, equipment and money, must be used efficiently and effectively. Project software provides different applications to assist with project planning, monitoring and controlling a project.

Project scheduling

One of the most common tasks of a managing a project is to schedule a series of events for the different activities to be completed. The duration and dependency of each event directly determines the length of the whole project. Project software can help automatically produce critical path diagrams or Gantt charts to help the FD with more effective scheduling, resource planning, monitoring and controlling the project. The software can also instantly update time plans if new information is entered and produce automatic reports comparing actual against budgeted time.

Budgeting and controlling cost

Project software can provide an application for entering costs for the completion of the student village e.g. budgeted or forecast cost for different resources or activities required, and also maintain information regarding actual costs and estimated costs to complete the project. Any causes and value of any deviations between budgeted and actual cost can be monitored during a project and reported in a timelier manner than if manual systems were used. Project software will therefore help the FD control costs, but also improve communication and reporting to the project board, project team or the two local businesses investing within the project.

Communication and coordination

Project management software provides many tools to help plan and communicate, including network analysis, Gantt charts, work breakdown structure and budgeting applications. It can also provide report templates with good graphical features to provide information and communicate with the various stakeholders of the student village project. Another application of project management software is the feature of calendars, diaries and reminders which will help coordinate meetings more effectively between the FD and his team or the project board.
Work breakdown structure

Project management software can help assist with planning and coordination of project staff by breaking tasks or activities down into more manageable and smaller units of work or activities to be completed e.g. WBS. Automatic schedules of work can be printed off and delegated to staff within the project team and would be ideal for monitoring their progress. Cost breakdown structure (CBS) can be used from a WBS as a feature to list every item of expenditure classified for the village project and get a more detailed estimate of its cost.

Risk management

Risk management is concerned with the identification of risks and any courses of action to deal with them. Despite all of the best planning, things do go wrong, cost can exceed budget, things can be late in delivery and key specialists may leave mid-way through. By the production of critical paths, resource diagrams, scheduling and the break down of workload, project management software can help the FD at the planning stage and as an on-going process to identify and manage risk. The information produced from reports can be used for contingency planning and the generation of courses of action should problems occur.

In conclusion project management software will help manage the sheer complexity of managing funds, equipment, staff and other stakeholders to achieve project objectives. It assists a PM with more accurate planning, monitoring and controlling of a project and helps coordinate and communicate with the various project stakeholders.

Solution to Question 5 (CIMA P5 Pilot paper 2005)

Planning

Work breakdown structure (WBS) can help assist planning by breaking tasks or activities down into more manageable and smaller units of work, activities or stages, it will help plan more effectively for budgeted cost, resources and time, and can be used to monitor and control the project of renovating the house that has been purchased. WBS can be used as an aid to producing some kind of planning document to allocate and delegate responsibilities, budget for cost and control the project easier by sequencing events to achieve maximum effectiveness and efficiency of resources used.

Budgeting

Cost breakdown structure (CBS) can be used from the WBS, listing every item classified as expenditure for the project in order to get a more detailed estimate of cost or expenditure. If as an example E has a more detailed breakdown of building work to be undertaken then this will help her obtain more accurate forecasts or estimates from builders, electricians or plumbers.
**Controlling**

Once the project commences actual expenditure or time can be tracked against each smaller task assigned, therefore regular progress can be monitored against the budget or plan e.g. using budget or time sheets for the plumbers to fit a central heating system or a new bathroom suite, can be used to take control action if appropriate, through the process of exception reporting.

**Risk management**

Risk management is concerned with forecasting uncertainties or the identification of risks and various strategies or courses of action to deal with them. E has a firm offer from a prospective tenant for them to move into the property in three months time. A huge renovation does not come without risk, plumbers could let E down, building work could escalate and costs could mount up. WBS will help E identify those activities which need to be undertaken, but also those that could have a huge disruption when it come to completing the renovation in three months time.

Despite all of the best planning, things do go wrong, cost can exceed budget, things can be late in delivery and key specialists may leave mid way through. Risk management is most likely to occur at the planning stage, but should be an on-going process whilst the project is being undertaken.

**Time management**

Although E has no experience of house renovation, she does have a rough idea of the sequence in which the various jobs will need to be carried out. By using WBS time management tools such as Gantt charts or network analysis could be prepared and used in the following way.

- To break down tasks into a sequence of activities to be accomplished
- To estimate the duration of each activity
- To arrange tasks in the most optimum sequence of events e.g. so the renovation work can be completed in the most efficient time possible

By a greater understanding of the different tasks to be undertaken, E can also organise her own time when it comes to deciding what work she can carry out herself e.g. basic repairs and decoration, and what tasks should be carried out by skilled specialists.
Suggested solution to Question 6 (CIMA P5 May 2007)

G has the ultimate responsibility for ensuring the desired result is achieved, that is, the building of a shopping centre on time, within cost and that meets the specified quality required. To manage this, resources such as staff, equipment and money, must be used efficiently and effectively. Tools and techniques that could help G in planning the project would be as follows.

Project scheduling

One of the most common tasks of a managing a project is to schedule a series of events for the different activities to be completed. The duration and dependency of each event directly determines the length of the whole project. Critical path diagrams or Gantt charts are useful tools to help G with more effective scheduling. Project software can also instantly update for time plans when new information is entered and produce automatic reports comparing actual against budgeted time.

 ✓ Can be used to plan the time scale of a project more effectively
 ✓ Graphical illustration of a schedule of tasks
 ✓ Highlights those activities which are ‘critical’ in order to manage risk more effectively
 ✓ PERT (Project Evaluation and Review Techniques) applied to network diagrams can give a better time estimation for a project by accounting for the uncertainty of task durations. The project manager could estimate the worse, best and most probable duration for each activity and then determine an average completion time.

Work breakdown structure

WBS can help assist with planning and coordination of project staff and resources by breaking construction tasks or activities down in to more manageable and smaller units of work or activities to be completed. Schedules of work can be printed off and delegated to staff within the project team and ideal for monitoring progress. Cost breakdown structure (CBS) can be used from a WBS as a feature to list every item of expenditure classified for new shopping centre build and provide a more detailed estimate of its cost.

 ✓ Can be used to allocate and delegate responsibilities
 ✓ Can help sequence and schedule events to improve effectiveness of allocating time
 ✓ Improves efficiency and planning for resources

Project management software

Project management software provides many tools to help plan and communicate, including network analysis, Gantt charts, work breakdown structure and budgeting applications. It can also provide report templates with good graphical features to provide information and communicate with the various stakeholders of the shopping centre project. Another application of project management software is the feature of calendars, diaries and reminders which will help coordinate meetings more effectively between G and his team.
SWOT analysis

SWOT analysis is a risk management tool and can be used for effective contingency planning. It also helps generate courses of action should problems occur.

Resource histograms

A resource histogram is a column chart that shows the number of resources assigned to a project over time. Resource histograms are normally presented as bar charts, this can be an effective tool when resource planning and coordinating staff.

In conclusion project planning tools and techniques help manage the sheer complexity of managing funds, equipment, staff and other stakeholders to achieve project objectives.

Suggested solution to Question 7 (CIMA P5 November 2007)– Part (i)

The purpose of project control is to develop the product or service that the project was commissioned to deliver within the triple constraints of time, cost and quality, in this case the implementation of a new customer information database.

Control is needed to ensure what is intended actually comes to be. The purpose of a good control system is to ensure that the right things get done, so there has to be some kind of plan, standard, budget, rule book or any other target to adhere to. Often by the use of exception reports, the project manager must detect material deviations from these plans and implement effective courses of action to correct any problems, if required, this would require accurate feedback on a timely basis. Control is dependent on the receipt and processing of information in the first place e.g. to determine what measures are needed, then further information (feedback) about actual performance to ensure targets or deliverables are being met.

There is a trade off or interdependency between the key project objectives of time, cost and quality. Its all a juggling act because if one variable is changed it could have a significant impact on another. In this case the project sponsor is pushing to make short cuts in order that the system goes live on time, this could have the effect of compromising the final quality of the system when implemented.

Suggested solution to Question 7 (CIMA P5 November 2007)– Part (ii)

X has the ultimate responsibility for ensuring the desired result is achieved, that is, the building of a new customer information database on time, within cost and that meets the specified quality required. To manage this, resources such as staff, equipment and money, must be used efficiently and effectively. Controls that could help X achieve the project deliverables would be as follows.

Clear gates and milestones established

Gates are significant events or major objectives that have been accomplished at different stages of a project. They would assess the key completion or quality of work achieved. Milestones are the completion of major interim goals of the project e.g. the key stages of a project from planning to delivery. Gates are a smaller milestone, but
well defined into the project management process, they are a firm deliverable that you can see and realise you have achieved.

A clearly defined and specific plan should specify in detail all resources required and express clear goals and objectives to be achieved by the project. It helps determine realistic deliverables for the new customer information database e.g. budgeted cost, resources and time, clear and realistic objectives can monitor and control the project once it gets under way. The alternative is more uncertain project deliverables and lack of control over the project generally.

**Information systems and regular reporting**

Control is dependent on the receipt and processing of information in the first place e.g. to determine what measures are needed, then further information (feedback) about actual performance to ensure targets or deliverables are being met. This would require essential project management software. Feedback involves gathering information on past performance from the output of a system, comparing it to a predetermined standard or plan and using any material deviations, as a basis of improving future performance. This therefore require accurate information being input in to the system and timely reporting of output for exception reporting.

**Accountability and reporting lines**

It is important that clear lines of authority are established, as well as a method of reporting established and communicated. This will ensure a good system of monitoring and controlling the project once it commences. PRINCE 2 defines roles in order to assign responsibility to project individuals e.g. project board, project manager, project assurance and support. With formal reporting lines and clear accountability it will avoid in future any project stakeholder that avoids responsibility by passing the buck.

**Identification and monitoring of risk**

During the planning stage, risk management should be used to identify risks and develop strategies to deal with them. Despite all of the best planning, things can go wrong, cost can exceed budget, things can be late in delivery or key specialists may leave mid way through a project. Controls such as can therefore help to avoid unexpected events which could have huge financial implications or delay the scheduling of the new customer information database.

1. Risk committee set up to address issues identified.
2. Risk register created which lists:
   - All identified risks e.g. ranked and prioritised.
   - Significance and consequences reported.
   - Assigned responsibilities to manage e.g. accountability.
   - Measures and actions taken to control each risk.
Project scheduling

One of the most common tasks of a managing a project is to schedule a series of events for the different activities to be completed. The duration and dependency of each event directly determines the length of the whole project. Critical path diagrams or Gantt charts are useful tools to help X with more effective scheduling. Project software can also instantly update for time plans when new information is entered and produce automatic reports comparing actual against budgeted time.

Work breakdown structure

WBS can help assist with planning and coordination of project staff and resources by breaking construction tasks or activities down in to more manageable and smaller units of work or activities to be completed. Schedules of work can be printed off and delegated to staff within the project team and ideal for monitoring progress. Cost breakdown structure (CBS) can be used from a WBS as a feature to list every item of expenditure classified for new shopping centre build and provide a more detailed estimate of its cost.

Project management software

Project management software provides many tools to help plan and communicate, including network analysis, Gantt charts, work breakdown structure and budgeting applications. It can also provide report templates with good graphical features to provide information and communicate with the various stakeholders of the project. Another application of project management software is the feature of calendars, diaries and reminders which will help coordinate meetings more effectively between X and his team.
Solutions to lecture examples
Chapter 7

Example 7.1

Give examples of risks identified, for a project to introduce a new computerised system?

- Inexperienced PM
- Limited experience or lack of skills of certain PM members
- Insufficient budget and contingency finance available
- Poorly led and motivated team
- End users information needs not well understood
- Possible loss of key personnel during the project e.g. high labour turnover
- Failure for the integration of computer systems later on with other applications
- New technology possible in future which may render the new system obsolete
- Rumour the software vendor is going into receivership
- Economic supply of programmers e.g. shortage of skills for good applicants
Example 7.2

Project budgets can be imposed using top-down (centralised) approaches e.g. project board sets the budget, or using bottom-up ( decentralised) approaches e.g. project manager or project team sets the budget.

What are the advantages and disadvantages of each?

Top-down

Advantages

✓ Only a certain level of funding available e.g. ‘client constraint’
✓ Much quicker process to set and impose e.g. less consultation required
✓ The project board may have more financial experience

Disadvantages

✗ May have less consensus by the PM and PM team e.g. creation of conflict
✗ Maybe de-motivating to the PM and PM team e.g. a lack of initiative given by the board

Bottom-up

Advantages

✓ Higher motivation to PM and PM team e.g. ownership
✓ Participative makes budget acceptance more likely by the PM and team
✓ PM and team could be more up to date in terms of the market value of transactions than a project board

Disadvantages

✗ Budgetary ‘slack’ or ‘buffering’ or ‘padding’ e.g. over estimation of costs allocated by participants just in case over spending does occur. This leads to inefficient allocation of finance
✗ Financial inexperience of PM and team
✗ Slower process to formulate a budget because greater consultation required
Example 7.3

The critical path is BCFG and the elapsed time 17 weeks

D can over run by up to 3 weeks without effecting the elapsed time of the project
Chapter 7

Example 7.4

Critical path ACDEFGIJ the elapsed time of the project is 25 weeks

H can over run by 2 weeks without effecting the elapsed time of the project