



APMP

The APM Project Management Qualification

Delegate Workbook 1

(Course Text, Pre-course Exercises and Exam Tips)



Course Text Structure

This manual provides a narrative text to be used in conjunction with the course slides that are provided separately. The text provides additional information and raises points that will be expanded upon during your course. In effect, this material is the 'course manual', which can be used as a reference source.

Section 2 of your manual has a number of short answer questions to help check your understanding as well as a number of exercises for you to attempt before attending the course. Later sections of the classroom material will provide exercises that will be covered during your training course as well as during your private evening study.

The APMP syllabus is based on the APM Body of Knowledge (BoK) Version 6. However, the syllabus does not follow the BoK order but, instead, allocates BoK topics into logical learning groups as set out in the APMP Syllabus. The topic order follows the APMP Syllabus structure in order to facilitate cross-reference. The APM BoK v6 topic references are included in the event that you want to cross-reference the learning material with the APM BoK v6. The BoK is not provided with the learning materials as it is not required.

Contents

1. Structure of Organisations and Projects.....	4
Organisation (APM BoK 3.1.4)	5
Project Sponsorship (APM BoK 1.1.8).....	15
Infrastructure (Project Office) (APM BoK 1.1.4).....	19
2. Project Life Cycle.....	22
Life Cycle (APM BoK 1.1.6).....	23
3. Project contexts and environments	30
Environment (APM BoK 1.2.1)	31
Operations Management (APM BoK 1.2.2)	35
Programme Management (APM BoK 1.1.2)	38
Portfolio Management (APM BoK 1.1.3).....	43
4. Governance and structured methodologies.....	48
Project Management (APM BoK 1.1.1).....	49
Project Management Method	54
Governance (APM BoK 1.1)	57
5. Communication.....	61
Communication (APM BoK 2.1.1).....	62
Conflict Management (APM BoK 2.1.2)	67
Negotiation (APM BoK 2.1.6)	74
6. Leadership and Teamwork.....	79
Leadership (APM BoK 2.1.5).....	80
Teamwork (APM BoK 2.1.7).....	90
7. Planning for Success	98
Business Case (APM BoK 3.1.1).....	99
Benefits Management (APM BoK 3.2.1)	101
Success factors and maturity (APM BoK 1.1.7)	105
Investment Appraisal (APM BoK 3.4.3)	110
Information Management (APM BoK 3.1.3)	114
Planning (APM BoK 3.1.5).....	119
Estimating	123
Stakeholder Management (APM BoK 3.1.6)	127
Law (APM BoK 4.4).....	131
Health and Safety (APM BoK 4.2)	134
8. Scope Management.....	140
Scope Management (APM BoK 3.2).....	141
Requirements Management (APM BoK 3.2.5).....	147

- Configuration Management (APM BoK 3.2.3)..... 151
- Change Control (APM BoK 3.2.2)..... 153
- 9. Schedule and Resource Management 159
 - Time Scheduling (APM BoK 3.3.2) 160
 - Resource Management (APM BoK 3.7)..... 173
 - Resource Scheduling (APM BoK 3.3.1)..... 174
 - Budgeting and Cost Control (APM BoK 3.4.1) 178
 - Control (APM BoK 3.1.2)..... 185
 - Earned Value Management..... 189
- 10. Project contexts and environments 197
 - Contract (APM BoK 3.7.1) 198
 - Procurement (APM BoK 3.7.3) 201
 - Provider Selection and Management (APM BoK 3.7.4) 207
- 11. Project Risk Management and Issue Management..... 210
 - Risk context (APM BoK 3.5.1) 211
 - Project Risk Management (APM BoK 3.5) 212
 - Risk techniques (APM BoK 3.5.2) 219
 - Identification 219
 - Delegation (APM BoK 2.1.3) 224
- 12. Project Quality Management 226
 - Project Quality Management (APM BoK 3.6)..... 227
 - Reviews (APM BoK 3.6.2)..... 236
- Course Content and APM BoK Topics Cross-reference: 241
- Course Content Alphabetical Listing:..... 243

1. Structure of Organisations and Projects

Coverage of Learning Outcomes:

- Distinguish between different types of organisational structure
- Responsibility Assignment Matrix
- Roles and responsibilities of project sponsor, project manager, team members, project steering group, users
- Relationship between project sponsor and manager
- Functions and benefits of a project office.



Organisation (APM BoK 3.1.4)

“Organisation is the management structure applicable to the project, programme or portfolio and the organisational environment in which it operates.”

APM BoK 6th Ed.

Projects are heavily influenced by the context within they are being executed and one of the primary elements of the project context is the organisation structure that has been adopted by the business. The chosen structure will have a significant impact on the management and reporting mechanisms for individual projects.

The organisation structure of a project will typically have four layers

External: representing the host or client organisation for the work. Requirements are defined and funding is provided by this level.

Sponsorship: provides a link between the management and external levels. The project sponsor has accountability for the overall success of the project and achievement of benefits.

Management: day to day responsibility for the management of the project.

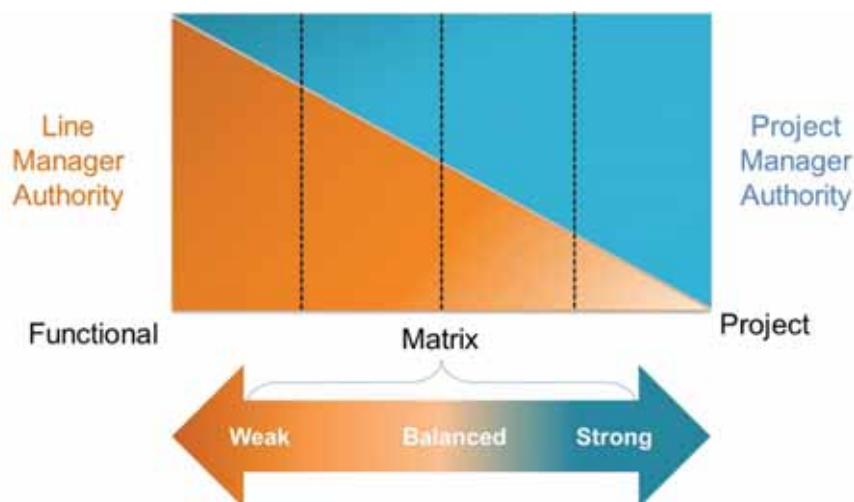
Delivery: those who create the outputs.

Alongside these four levels are assurance and administrative support. Assurance provides confidence that the management and delivery of the work are being conducted effectively and appropriately. Administrative support provides services to the management and delivery levels of an administrative and/or technical nature.

Temporary project, programme or portfolio organisations may be supported by a permanent governance infrastructure that ‘owns’ P3 management. This is usually referred to as an enterprise project management office (EPMO).

Organisational continuum

Depending upon the nature of the project and the organisation’s principal business, there are significant implications for how projects are structured, staffed and managed. There are three basic types of organisation structure within which projects are delivered: ‘Functional’, ‘Matrix’ and ‘Project’. They could be considered as a continuum where the relative authority between the project manager and the functional manager shifts. This is represented in the ‘Organisational Continuum’.



One side of the organisational continuum indicates that in a functional organisation, the functional manager has full authority. In other words, the functional manager has control over everything that takes place within that department. Work is typically exclusively related to routine operations. The level of change is minimal as is the level of project activity.

The other side of the continuum indicates that, in a project (or task force) organisation, the project manager has full authority. The project manager has control over everything that happens in the project. Routine operations do not exist (or are confined to support functions) – projects represent the majority of business activity. The project manager has responsibility for staff well-being and development.

Between these two extremes are versions of matrix organisations – combinations of functional and project authority.

As a project progresses through its different phases there may be a change in the type of organisation applied to the project. This may revolve primarily around the size of the team needed to complete each of the various project phases.

Organisation Types

Functional	Matrix	Project
Traditional departments headed by functional managers. All departmental staff report to that manager. Any projects that are required are co-ordinated	Provides a balance of authority between the department head(s) and the project manager(s). Projects are resourced by drawing full or part time staff from departments.	Staff members work in dedicated full time project teams which are commensurate to the size of the project. The project manager has full authority.

Functional	Matrix	Project
<p>at a senior level</p> <p>Project management approach is immature and confidence in running projects is limited.</p> <p>All experience is associated with routine operations and optimisation of process and output.</p> <p>External customers see no single project manager.</p>	<p>Teams may be co-located.</p> <p>Good for organisations that undertake many projects and routine operations.</p> <p>Project managers have authority for the project.</p> <p>Department managers have authority for the welfare of staff and the efficiency of the department.</p> <p>Project managers may be located within departments or in a Project Office.</p>	<p>This type of organisation is common for very large projects or organisations whose primary business is project-related (e.g. consultancies).</p>

Types of Matrix Structure

Weak Matrix

As functional organisations undertake more projects, and experience and confidence builds, authority can be delegated downwards. This often leads to the appointment of a project co-ordinator within a department. However, authority remains weak from a project perspective.

Balanced Matrix

The business of many organisations is likely to be a mixture of projects and business-as-usual. The balanced matrix recognises the need for a dedicated project manager but falls some way short of delegating full authority for the project to this individual.

Strong Matrix

As projects increasingly contribute to the revenue stream of the organisation, more resources can be invested in project teams. This is often reflected in the setting up of a projects department or project office. The projects department is responsible for providing full / part time project managers for projects. Team members continue to be drawn from departments. There is a much stronger emphasis on projects.

The Case for the Matrix

As many organisations undertake projects and operational work, the matrix may be the only feasible organisation structure. It combines the advantages of the functional and the project organisation but introduces complexity and the potential for conflict.

- a formal, two-dimensional solution to a two-dimensional problem - reflects reality

- improved management of projects where task force structures are inappropriate
- preserves the benefits of a functional structure
- economical use of expensive resources
- retains an element of job security
- good for organisations that routinely carry out projects

Requirements for Success

Key aspects that must be treated proactively to make a matrix work include:

- balancing functional and project authority on projects
- project manager's authority is accepted at project level
- functional departments deliver to agreed standards
- project managers do not supervise HOW jobs are done
- commitment from the whole organisation
- strong management support and involvement
- resourcing issues must be addressed.

Matrix Roles and Responsibilities

Clear roles and responsibilities are the key to making matrix structures work. The project manager has control of Scope, Time, Cost and Quality / Performance (deliverables).

The Functional Manager has control over the techniques used to deliver the products. Within the specification and budget for the task / work package, the functional manager is allowed the freedom to decide the approach and resources used (to a certain degree). Resource Management is one of the issues in a matrix structure which needs to be clearly defined and agreed.

Strengths and Weaknesses of Organisation Types

The table below illustrates the strengths and weaknesses of the three main types of organisation structures:

	Strengths	Weaknesses
Functional Organisation	<ul style="list-style-type: none"> ▪ Develops strong specialist skills ▪ Facilitates efficient resource usage ▪ Departmental lines of communication are clear ▪ Good if project is contained within one function ▪ Compromise solution for organisations that do not undertake many projects 	<ul style="list-style-type: none"> ▪ Tends to concentrate on specialist goals ▪ Inadequate integration - lack of motivation? ▪ Inhibits development of general management skills ▪ Slow response / rate of change ▪ Little customer focus - single point of contact?
Project Organisation (Task Force)	<ul style="list-style-type: none"> ▪ Strong commitment to the project - single purpose and a high degree of autonomy ▪ Integration of multiple disciplines ▪ Develops general management skills ▪ Clear management definition - team members know where they stand ▪ Can operate with informal communications ▪ Precise budget including transparent PM costs 	<ul style="list-style-type: none"> ▪ Highly visible - may upset established organisation ▪ Duplication and inefficient resource usage therefore increased cost ▪ Reduced job security and unclear career paths ▪ May be prone to symptoms of 'groupthink' ▪ Sharing of lessons-learned can be problematic ▪ Team can become distracted near end of project
Matrix Organisation	<ul style="list-style-type: none"> ▪ Balance between projects and business as usual ▪ Integration of projects within functional departments ▪ Specialist knowledge is developed and not lost ▪ Global priorities are visible ▪ Flexible and efficient use of resources 	<ul style="list-style-type: none"> ▪ Individuals have two or more bosses ▪ Project managers feel they have inadequate authority ▪ Organisation structure is more complex ▪ Functional and project resource problems ▪ Conflict and stress are likely ▪ Constant change (forming, storming etc.)

Organisational Roles

The APM BoK 6th edition, section '1.1 Governance' states that good governance can be demonstrated *through “establishing clearly defined roles, responsibilities and performance criteria for governance”*. The primary roles and responsibilities for a project are listed below, although it should be noted that these may vary across different organisations and at times even across different projects within the same organisation.

The reporting and communication lines between the different roles should also be outlined to ensure clear definition of responsibility and accountability for each role.

Project Steering Group

A project steering group may exist for larger projects and should include representation from the business (typically the sponsor), the customer or users of the deliverables (for example functional managers) and those who are producing the actual deliverables (which can include external suppliers).

The steering group (sometimes known as a project board) provides strategic guidance of the project and is responsible for assuring that the project is being managed correctly (although this may be delegated to the project office or a separate project assurance group). It is typical for the steering group to be heavily involved in the resolution of project issues and also stage-gate sign-off.

Project Sponsor

There is significant overlap between the role of the sponsor and that of the steering group. Where a steering group exists, this will be chaired by the sponsor. Where one does not exist, the sponsor will be accountable for all of the responsibilities listed above, including the liaison with and arbitration between project stakeholders.

The prime responsibility of the sponsor is the ownership of the business case and its continuing viability, culminating in the measurement of the realised benefits at some point in the 'Operations' phase¹.

Project Manager

The project manager is accountable for delivering a product capable of achieving the project's agreed benefits. This must be done in accordance with the success criteria defined in the project management plan (typical targets include time, cost and quality and in certain environments – safety). The project manager may or may not possess subject-area or technical specific skills. They must however be able to define and plan the project and be competent in a range of project management tools and techniques. The project manager must also ensure the motivation of the team members which will mandate the use of interpersonal and influencing skills; effective communication being arguably the single most important skill for any project manager.

¹ See topic 'Life Cycle (APM BoK 1.1.6)' for more details on the Operations phase.

Team Members

Team members (including external suppliers) are responsible for creating the project deliverables. They must respect the authority of the project manager and provide support in the management of risks, issues and change. Team members and subject matter experts will be heavily involved in the identification of risks and the estimation and sequencing of project activities. Regular status updates from the team are crucial if corrective action is to be taken in an informed and timely manner.

Users (Customer)

The 'users' should define the *need* for the project and provide the necessary input to the specified requirements and acceptance criteria. Users may also be involved in defining the project constraints including the relative priority of time, cost and quality – although they must respect the authority of the sponsor in ultimately making this decision.

Project Office

The project office is likely to be heavily involved in the governance of the project including the mandating of project control and reporting mechanisms. If required to do so, the project office might audit selected projects to ensure compliance with agreed processes and provide an objective view of a project's health.

The project office should however adopt a predominantly supportive role, providing guidance on the use of project management tools and techniques. This may even include the provision of specialist skills (for example, project planners). The project office can also provide mentoring and development for project staff.

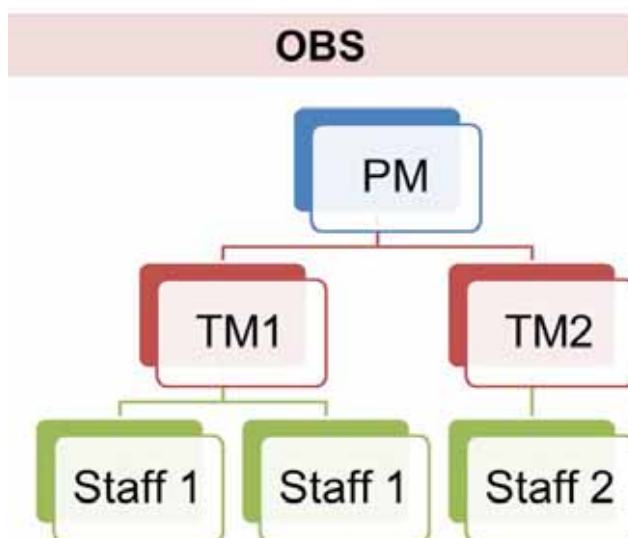
Additional stakeholders (internal and external to the organisation) may play a part in the management and execution of a project. Typical internal stakeholders will include functional managers, procurement, quality, human resources and finance. Additional external stakeholders might include regulatory bodies and other interested parties. Irrespective of who is involved, it is essential that everyone clear understands their role and how they can contribute to the successful delivery of the project.

The Organisation Breakdown Structure (OBS)

An Organisation Breakdown Structure (OBS) defines the organisation of the project team i.e. the human resources working on the project.

The roles in the project can be represented in a hierarchical way by using the OBS. It follows the same format as any typical hierarchical structure in a functional organisation showing reporting and communication links.

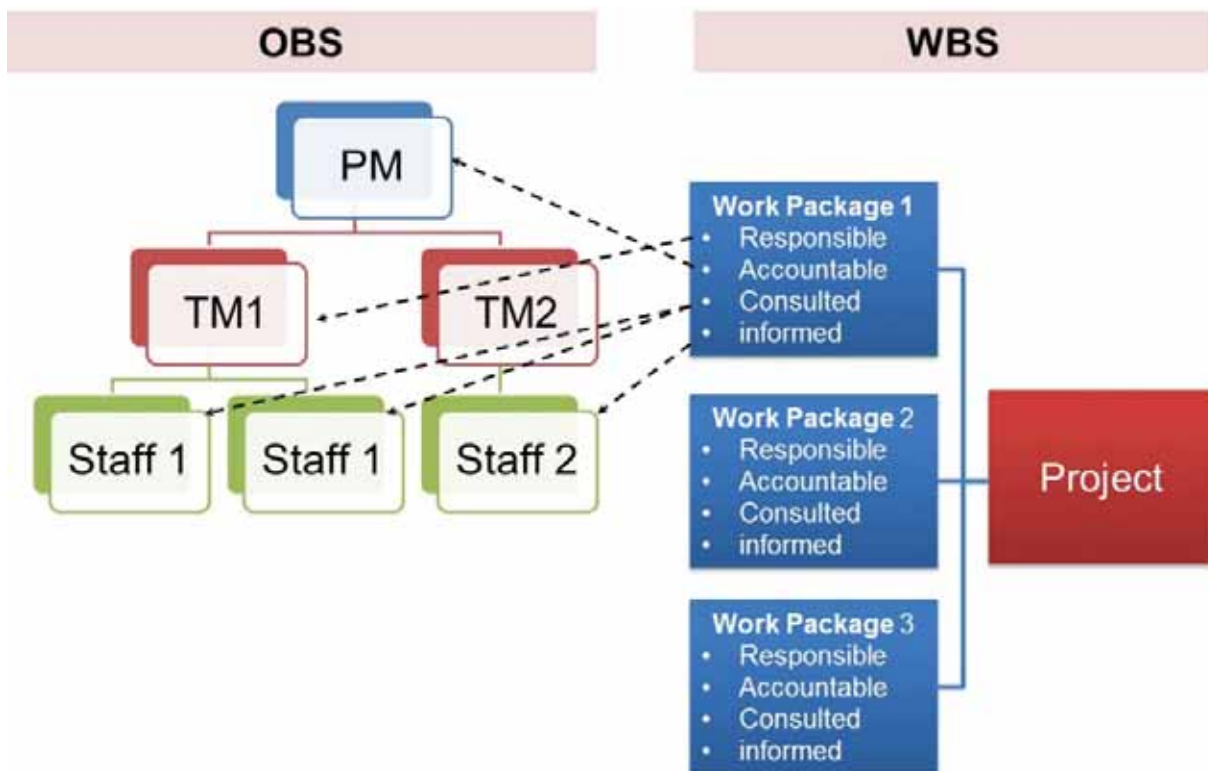
The content of the OBS will depend upon the type of organisation structure in which the project is being undertaken. Although in a 'functional' and 'project' organisation the OBS will probably be very similar to the normal organisation structure, the reporting lines in a matrix structure are very likely to be different to the organisation's normal reporting lines.



Linking the OBS and the WBS (RAM Charts)

The Organisation Breakdown Structure (OBS) defines who does what on projects. The OBS also illustrates the agreed reporting lines within projects. The OBS can be linked to a Work Breakdown Structure (WBS)² through the use of a Responsibility Assignment Matrix (RAM).

² See topic 'Scope Management (APM BoK 3.2)' for more details on the WBS.



Responsibility Assignment Matrix (RAM)

A RAM chart is used to help define who is responsible for each of the project's deliverables or work packages. The matrix is developed with two primary axes:

- key deliverables or work packages
- resources

The matrix is essentially a consolidation of the WBS and OBS. The RAM is typically high-level as it can become onerous to develop and maintain if the level of detail becomes too great (for this reason, multiple charts may be developed separately for different levels of the organisation). Once the deliverables and stakeholders have been listed, the team then decides who is:

- R – Responsible
- A – Accountable (or Approves)
- C – Consulted
- I – Informed

The chart provides a useful indicator of potential bottlenecks where a single stakeholder may be overloaded or where potential gaps in responsibility exist. Typically, the project manager will try to assign single-point accountability and responsibility to ensure that confusion regarding who-does-what is minimised. For this reason the chart is

sometimes expanded to also show those who may *support* the creation of specific deliverables (i.e. a RASCI chart).

Ownership rests ultimately with the person who is 'Accountable'. The work is performed by the person(s) 'Responsible', who may have to 'Consult' others whilst doing it. Others may need to be 'Informed' that work is starting or of its completion, maybe to use the new output or for configuration purposes.

There must always be someone Accountable and someone Responsible for each piece of work; this could be the same person. There may or may not be the need for the "C" or "I".

		OBS			
		PM	TM1	S1	S2
WBS	Charter	C	A/R		I
	PMP	A/R	C	C	C
	Risk Log	A	I	I	R
	Product Desc.	R	A	I	C

Project Sponsorship (APM BoK 1.1.8)

“Sponsorship of a project, programme or portfolio is an important senior management role. The sponsor is accountable for ensuring that the work is governed effectively and delivers the objectives that meet identified needs.”

APM BoK 6th Ed.

Although day-to-day management of projects is delegated to a project manager, the project sponsor retains ultimate accountability for the success of the project and must ensure that it is kept under control and that key decisions are made in an informed and timely manner.

The sponsor may be supported by a number of other senior managers, who are often referred to as the Steering Group or Project Board. Where a board exists, the sponsor is still ultimately accountable for the project and needs to continue to play an active sponsorship role.

The project sponsor (sometimes known as the Project Executive, Project Director, Client or Senior Responsible Owner (SRO)) is accountable for the benefits that are to be realised by the project outputs. As such, the sponsor needs to make sure that the project is effective, i.e. that effort is directed towards the correct outcomes. The project manager is focused on the delivery of outputs in as efficient a manner as possible.

The sponsor can be thought of as the link between the project and the outside world. The sponsor will often act as the client representative on the project management team. It is crucial that there is an active dialogue between the sponsor and the project manager in order that both parties are fully aware of any internal or external factors that may have an impact on the viability of the project. Clear and agreed reporting mechanisms are fundamental in order that sensible decisions are made.

The leadership and support provided by the sponsor is a critical success factor on any project. The designated sponsor must have the relevant business and project expertise in addition to having the available time necessary to provide this support.

Sponsor Responsibilities

The sponsor is the main business driver of the project and is often thought of as being the primary risk-taker as (s)he may well provide the funds for the project. Overall direction of the project is often delivered by a Steering Group and the sponsor will chair this body. In order that appropriate support is offered, the sponsor has certain key responsibilities which may include (but are not limited to) the following:

Responsibility	Description
Business Case ownership	The sponsor is responsible for the delivery of the benefits that are quantified in the project's business case. The sponsor must also ensure that each project is initiated in alignment with the organisational strategy without excessive risk being incurred.
Approve the PMP	The Project Management Plan (PMP) is often thought of as the contract between the project manager and the sponsor. The sponsor must agree that the baseline scope, timescales and budget meet their expectations and that the level of identified risk is acceptable. The sponsor must also agree that adequate mechanisms are in place to monitor and control progress throughout the project.
Stakeholder arbitration	The sponsor plays a key part in the identification and management of parties who have an active interest in the project. The sponsor must therefore possess the necessary interpersonal skills required to arbitrate where stakeholders have competing interests.
Stage-gate approval	The sponsor must commit to the continued funding of the project allowing it to continue on its agreed path. This will involve frequent review of progress to-date and forecasts for completion. Stage-gate approval should also depend on the evaluation of external factors that may have an impact on the project's viability.
Approve changes	Recommended changes that have an impact on any of the project's defined objectives must be approved by the sponsor prior to implementation. Alternatively the sponsor may decide to reject or defer a decision until more information is provided.
Resolve Issues	Concerns that cannot be resolved by the project manager must be escalated to the sponsor. These issues must be resolved in a timely manner in order that execution can progress as planned.
Accept deliverables	At project handover, the sponsor will ultimately agree that the deliverables have met the defined acceptance criteria so that the closeout process can begin. The sponsor is also likely to be involved in the post-project review.

Responsibility	Description
Review benefits	The sponsor is responsible for ensuring that a formal review of the realised benefits is undertaken at agreed points during the 'Operation' phase of the extended project life cycle. The agreed business case provides the basis of this review.

'Into the Den'

It is clear that the role of the project sponsor should not be undertaken lightly. The relationship between the sponsor and the project manager is fundamental to the success (or otherwise) of the project. As well as the necessary financial support, sponsors also provide assistance in the following areas.

- **focus on project benefits:**
 - whereas project managers concentrate on project deliverables, the sponsor's key focus is the delivery of benefits, irrespective of the technical excellence that may be on offer.
- **stakeholder management and 'Political Fixer'**
 - in addition to 'financial clout', the sponsor needs to have an array of skills and contacts that can help project managers obtain access to resources and overcome possible barriers that threaten the efficient creation of the project deliverables.
- **strategic alignment:**
 - appropriate selection of sponsors will ensure that suitable synergy exists between the project and the business interests of the sponsor. The sponsor is also better placed to understand the key drivers that may positively or adversely impact the project.
- **objective management of risk:**
 - project managers often have a very emotional and tangible attachment to their projects. This can lead to an inflated valuation of the project deliverables and an under-estimation of the risks involved. The wider perspective of the sponsor should lead to a more objective assessment of risk, especially those risks that are related to the business and the ultimate achievement of benefits.

Project sponsors and project managers are heavily reliant on each other, with the project manager being directly accountable to the sponsor. Tension and conflict between them can have a positive impact on the project if managed correctly. Their different, and sometimes competing perspectives, should lead to the selection and ultimate delivery of a better overall solution for the mutual benefit of all parties.

Taking the above into consideration, it becomes apparent that a sponsor needs to be:

- a business leader and decision-maker with the credibility to work across corporate and functional boundaries
- an enthusiastic advocate of the work and the change it brings about
- prepared to commit time and support to the role
- sufficiently experienced in projects, programmes and portfolios to assess whether the work is being managed effectively and to challenge project managers where appropriate

Infrastructure (Project Office) (APM BoK 1.1.4)

“Infrastructure provides support for projects, programmes and portfolios and is the focal point for the development and maintenance of project, programme and portfolio management within an organisation”

APM BoK 6th Ed.

Good governance requires a permanent organisational infrastructure that supports the temporary structure of a project. These structures can be referred to as:

- Project Support Office (PSO): A PSO is typically assigned to a single project and provides administrative support to the Project Sponsor and the Project Manager. This can include maintenance of the project logs and registers, maintaining the project plan, collation and circulation of project reports etc.
- Projects Office (PO): A PO typically provides administrative support to a number of discrete projects. Efficiencies are gained by having a consistent approach and single set of systems.
- Programme Management Office (PMO): A PMO is typically assigned to a programme to support the programme and associated projects. As well providing administrative support, it plays an important role in ensuring the governance processes are adhered to (escalating risks to the appropriate level etc.). It will typically manage resource allocation across the programme. It provides an immediate adoption of lessons learnt/best practice across the programme.
- Programme and Project Support Office (PPSO): A PPSO is typically set up to support the programmes and projects across an organisation, or a department or division with the organisation. It provides a central repository for all project and programme information and typically owns the project delivery method and tools.
- Enterprise Programme Management Office (EPMO): An EPMO works across a full organisation. Its primary focus is maintaining the programme/project register and providing information to senior management in order to support decision. The EPMO provides a key role in enabling the organisation to identify, select and deselect projects and programme to be undertaken.

The name used will reflect the scope of responsibilities within that function.

Role of the Project Office

The specific duties of the project office will vary across different organisations but typical responsibilities include:

- administrative support and assistance to project managers. This may take the form of assistance in areas such as planning, risk management, change control and support the sharing of project lessons across the organisation.
- providing administrative and logistical support in areas such as taking the minutes of meetings, travel arrangements, filing and other support services.

- technical support that includes the collection, analysis, reporting and presentation of project information. The project office may collate the status of projects across the programme or portfolio and provide consolidated information to senior management. This includes managing the interdependencies and handling communications with stakeholders.
- assurance of governance structures and standard project management practices through undertaking audits, health checks and phase end reviews.

A sophisticated infrastructure may also cover:

- provision of subject matter expertise to ensure that there is access to all necessary tools and techniques
- training, coaching and mentoring for the project, programme or portfolio management team
- maintaining the infrastructure, momentum and drive to support communities of practice
- improving, embedding and measuring capabilities to achieve higher levels of maturity
- owning and deploying standard tools and techniques, thus assuming responsibility for maintaining the project methodology and associated processes, procedures, templates and checklists.

Benefits of a Project Office

As the range of responsibilities undertaken by the Project Office varies significantly across different organisations, the benefits that they provide will also differ quite widely. In general, the Project Office provides a centralised support and assurance function that can help increase the effectiveness of project management within the organisation.

Disadvantages of not implementing a formal PMO

- no rigorous PM methodology, formal project steps might be missed. Since no formal methodology is in place, projects sequences might not be repeatable and prone to errors and oversight. Projects have a greater likelihood of being delivered late and over-budget
- staff members are assigned the 'PM hat' along with their other duties. The PM role is a by-product of the assignment to a project
- difficulty in comparing performance of dissimilar projects
- no formal metrics on how projects are performing
- no templates: SoW (Statement of Work), WBS (Work Breakdown Structure), project plans and reports might all vary in appearance and content
- the organisation might not have a knowledge-based project repository

- projects might not have proper close-down; no lessons-learned to put in a knowledge-based project repository
- because there are no formal full-time PM's, formal training and 'passing the baton' to junior members might not occur
- the organisation may get by doing its projects, but results and lessons learned might not be repeatable
- schedule granularity might be inconsistent between PM's
- probably no standardised tools

Benefits of implementing a formal PMO

- a rigorous method, along with templates, full-time PM's, a knowledge base, metrics and standardized tools means that project estimation, scheduling, risk mitigation are more consistent. Projects are more likely to get delivered on time, within budget and with a minimum of surprises
- with a centralized-PMO implementation, all PM's assigned to projects are dedicated 100% to project management, as opposed to 'matrixed' individuals who are in charge part-time
- all the necessary phases / steps of a project are completed. Important lessons learned are captured
- metrics. Earned value analysis can be put in place to better compare the performance of dissimilar projects. Now the red / yellow / green status assigned to various projects can be consistent
- a knowledge-based project repository is maintained. A repository can help a PM determine if a current project is similar to another in the past, and alert him / her to some of the challenges the previous project faced
- templates are available. All project documents will have same look-and-feel; projects will have their complete set of supporting docs; no more hunting around for salient information
- standardised tools. All projects would use MS Project, for example
- mentoring and handoff to junior members. No longer is the organization reliant on a single individual or informal group of individuals as its project management knowledge base. The PMO can accommodate the addition of new members with history, training and methodologies. The PMO can live on after its original members have moved on to different roles
- with a centralised PMO, PM resources can be better and more evenly deployed
- in a PMO, knowledge sharing between projects is encouraged. Unrelated projects might be encountering the same challenges and the PMO can facilitate communication between these projects

2. Project Life Cycle

Coverage of Learning Outcomes:

- Project life cycle phases
- Difference between project life cycle and extended life cycle
- Sharing knowledge
- Benefits of conducting reviews.



Life Cycle (APM BoK 1.1.6)

“A life cycle defines the inter-related phases of a project, programme or portfolio and provides a structure for governing the progression of the work.”

APM BoK 6th Ed.

The APM defines a project as a “*unique, transient endeavour undertaken to achieve planned objectives*”. The transient nature of projects means that they have a beginning and end (and by implication, each project will also have a ‘middle’). Project management is therefore primarily concerned with ensuring that each project has a controlled start, middle and finish and a formal life cycle plays a large part in ensuring that this occurs

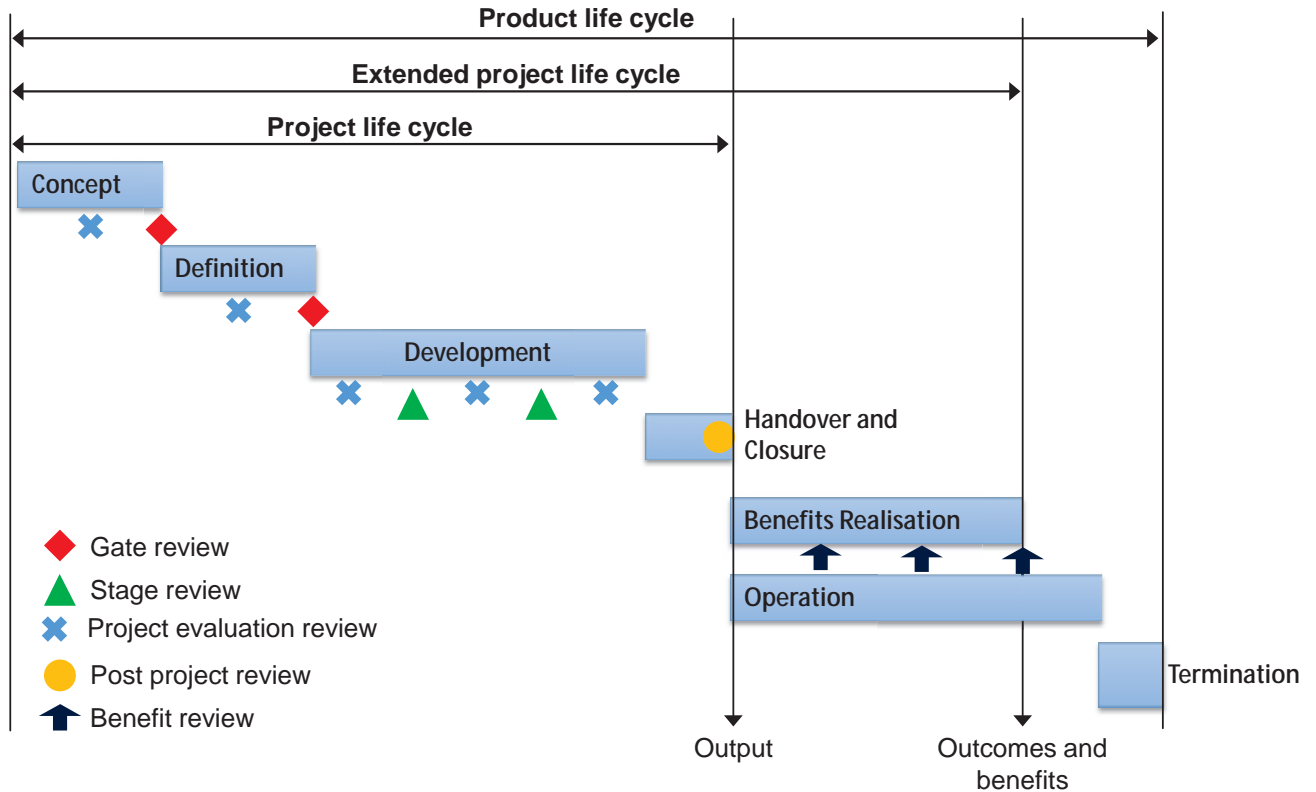
All projects are designed to deliver objectives which may be expressed as outputs, outcomes or benefits. Based on the definition above, a life cycle illustrates the distinct phases that take an idea, develop it into detailed objectives and then deliver these agreed objectives.

No single life cycle applies to all projects and it is likely that each organisation will develop a life cycle that is tailored to its specific needs. This being said, life cycles are likely to consist of similar generic phases. The most common is the linear life cycle, also referred to as the linear sequential model or waterfall method. A table of typical life cycles could include:

Life cycle name	Description
Linear or Linear sequential model or Waterfall model	The waterfall model is a sequential design process, often used in software development processes, in which progress is seen as flowing steadily downwards (like a waterfall) through the phases of Concept, Initiate, Analysis, Design, Construct, Test, Production/Implementation, and Maintenance
Parallel	Similar to the linear or Waterfall model, but the phases are carried out in parallel to increase the pace of delivery
Spiral	Often employed where many options, requirements and constraints are unknown at the start – typical in a research environment. The basic idea behind this method is to develop a system through repeated cycles (iterative) and in smaller portions at a time (incremental), allowing researchers to take advantage of what was learned during development of earlier parts or versions of the system.
‘V’	Applied in software development where requirements are defined and the development tools are well known

Project and Extended Life Cycles

A typical linear project life cycle is likely to consist of the following primary phases and associated key actions:



Phase	Description
Concept	<p>The phase develops an initial idea and creates an outline business case or project brief and schedule. A sponsor is appointed and where appropriate a project manager. Sufficient analysis must be performed to enable senior managers, led by the project sponsor to make two key decisions:</p> <ul style="list-style-type: none"> • Is the project likely to be viable? • Is it definitely worth investing in the definition phase? <p>Key actions include:</p> <ul style="list-style-type: none"> • Customer consultation • Needs and requirements identification and definition • Stakeholder analysis • Identification of benefits • Production of approved need statement • Options study

Phase	Description
	<ul style="list-style-type: none"> • Preferred option selection • The creation of the business case (outline business case or project brief)
Definition	<p>The preferred solution is identified and ways of achieving it are refined and detailed plan(s) in the form of the Project Management Plan (PMP) as well as the detailed business case for the project is created. These need to be approved by the project sponsor before progressing to the next phase.</p> <p>Key actions include:</p> <ul style="list-style-type: none"> • High level design of chosen option • Refined estimates of timescales and costs • Risks identification and assessment • Identification of required resources • Project team formation • The creation of the PMP and detailed business case
Development	<p>The project management plan is put into action. This phase may be broken down into further stages at the end of the continued viability of the project can be reviewed.</p> <p>Key actions include:</p> <ul style="list-style-type: none"> • Execution of plans • Expediting • Monitoring • Reporting • Change control • Leadership • Conflict management
Handover and Closure	<p>The project outputs are handed over and accepted by the sponsor on behalf the users</p> <p>Key actions include:</p> <ul style="list-style-type: none"> • Test • Commissioning • Acceptance of deliverables by users • Training of users • Handover of deliverables from project to production environment • Review • Disbanding of team • Dissemination of lessons learned

Phase	Description
Benefits realisation	<p>Where appropriate, a project may include a benefits realisation phase. This will depend to a large extent whether the project is delivered internally to the organisation or to an external client.</p> <p>Key actions include:</p> <ul style="list-style-type: none"> • Implement the benefits realisation plan • Conduct benefits realisation reviews • Life extension and value adding initiatives • Lessons learned initiatives

Extended Project Life Cycle and Product Life Cycle

The extended project and product life cycle includes an Operational and Termination phase in addition to the phases detailed above.

Phase	Description
Operations	<p>The project deliverables are utilised with possible on-going support and maintenance being provided; it is also during this phase that a formal review of the realised benefits will be undertaken</p> <p>Key actions include:</p> <ul style="list-style-type: none"> • Operation • Maintenance • Benefits realisation • Post-investment reviews • Life extension initiatives • Lessons learned initiatives
Termination	<p>Project assets are disposed of in an appropriate manner</p> <p>Key actions include:</p> <ul style="list-style-type: none"> • Disposal • Environmental assessments • Disbanding of operational team • Lessons learned

Life Cycle Benefits

Effective structure and control of the project is more likely if a consistent formal life cycle is adopted. Ensuring that the objectives and content of each phase are clearly understood will help gain active commitment from the team and other project stakeholders.

Specific benefits may also include:

Improved decision-making and control:

Each phase/stage of the project will have clearly defined deliverables and activities. Formal gate-reviews will also help stakeholders make informed decisions regarding the project in light of new information relating to time, cost, performance and other expectations.

More focus on the early life cycle phases:

The life cycle should help the organisation better govern their projects through the mandatory creation and approval of the project's Business Case and Project Management Plan. These outputs can then be used throughout the project to maintain focus and control.

More effective planning:

Each phase of the project will require different resources and skill sets. Both resource and financial planning will be greatly enhanced through the use of a formal life cycle. A rolling-wave approach to planning can also be facilitated through the adoption of a phased approach.

The life cycle will form the basis of the project management method:

Having a defined set of tools/templates, outputs and roles and responsibilities for each stage of the project will form the basis of the organisation's project method. This consistent approach will allow more effective stakeholder communications as well as increasing the likelihood of more effective handover of deliverables between stages.

Improved stakeholder communication and understanding:

A consistent life cycle approach will help stakeholders understand what has been delivered so far and what work is outstanding. Consistent reporting of project status (for example, earned value reporting during the implementation phase) will greatly improve communication, again allowing more effective decisions to be arrived at. The end of each phase or stage is likely to be marked with a key milestone and these can then be used to communicate progress to interested parties.

Project Reviews³

The phased structure facilitates the creation of governance and feedback mechanisms as follows:

- **Stage review:** development work can be further sub-divided into a series of management stages with work being authorised one stage at a time. At the end of a stage the sponsor – and steering group if there is one – will review progress to date, state of the project plan, the business case and risks, and the next stage plan to determine whether to continue with the project
- **Gate review:** these are conducted at the end of each phase or stage. This marks a key decision point in the project where senior management will consider performance to date and sanction the continuing investment in the project based on a formal evaluation of its present and forecasted progress. Plans for the next phase will also be reviewed and external factors that may impact the viability of the business case will also be considered before deciding on the continued viability of the project
- **Project evaluation review:** the project evaluation review provides the project manager and the team with an opportunity to formally review the present health of the project. This will include evaluation of the likely achievement of the project success criteria as well as reviewing the suitability of technical and management processes. Corrective actions and lessons should be agreed and documented. At a minimum, a project evaluation review should be held before every stage-gate review. Where a review is conducted by an external party (e.g. project office or external auditor) then the review is known as an audit. The audit may be triggered by concerns regarding the governance of the project and/or to determine its continuing viability
- **Post-project review:** learning from experience is a key factor in the maturity assessment of an organisation. Post-project reviews document the lessons learned for use in the future
- **Benefits review:** measures the achievement of benefits against the business case. The sponsor is accountable for the realisation of the project benefits. These benefits typically materialise after the project closure when the project deliverables have been in operational use for some time. Multiple benefits realisation reviews may be required depending on the nature of the project.

Benefits of Project Reviews

Project reviews are necessary for a variety of reasons. Although not always welcomed by the project team, benefits of a formal examination of a project's health might include:

- better decision-making
- *objective* review of a project's health
- improved governance of projects

³ Further details on types of Project Reviews is provided in the section 'Reviews (APM BoK Topic 3.6.2)' in section 12 Project Quality Management

- sharing of lessons learned (and the subsequent improvement of technical and management processes)
- more timely implementation of corrective action
- increased stakeholder confidence (including senior management, project funders and customers)
- increased likelihood of project success (this includes achievement of the agreed success criteria and realisation of benefits).

3. Project contexts and environments

Coverage of Learning Outcomes:

- Project context, environmental factors
- Use of PESTLE, SWOT
- Difference between project and business as usual
- Characteristics of programme management
- Challenges of programme management
- Situations where portfolio management is used
- Distinguish between project management and portfolio and programme management
- Health safety and environmental legislation.



Environment (APM BoK 1.2.1)

“The circumstances and conditions within which the project, programme or portfolio must operate.”

APM BoK 6th Ed

Setting describes the relationship between the project, programme or portfolio and the host organisation. Projects, programmes and portfolios do not exist in isolation and the management of these is influenced by the prevailing environment and other broad management disciplines.

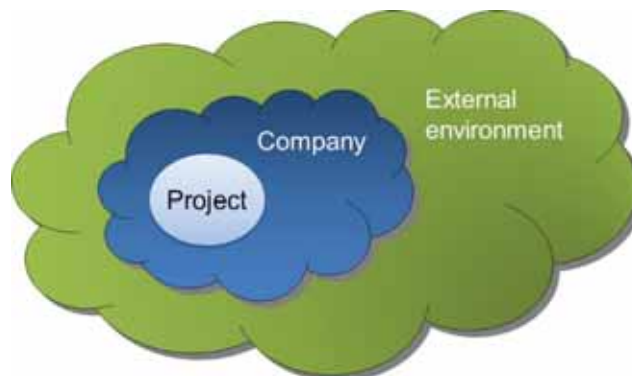
The project context includes the consideration of the internal (organisation) and external environments in which the project is undertaken. Projects can affect, and be affected by their internal and external environment leading to positive or negative impacts on project objectives.

Key questions to consider include:

- What influenced the requirement?
- How will the business affect the project?
- What is the project’s status relative to other projects?
- Is the project in line with key company strategies?
- What will be undertaken after project completion?
- How will the deliverables be operated?

Environment covers anything that can affect project execution and also includes everything that has taken place already (pre-project) and all that will take place after (post-project).

The internal environment includes the working environment in which the project is undertaken. This may be governed by policies, standards and processes that are externally defined and adopted by the organisation such as regulatory, industrial and professional standards. It will also be governed by the organisation’s own policies, standards and procedures (Governance).



Consideration must also be given to the internal organisational factors, strategies, processes and procedures and management style in force at the time the project is undertaken. Other factors such as resource and skills availability, and access to project funding will need to be taken into account. This will provide an overall understanding and appreciation of the areas and elements that may have a bearing on the successful outcome of the project.

The external environment typically includes a number of influences that may affect the organisation and, consequently, the project. Sometimes they directly impact on project objectives. For example, new health and safety legislation may require changes to both standard Business as Usual (BAU) procedures and new methods that may be under development through a project.

A number of prompt lists exist which assist in considering the project environment. The following are the more popular:

SWOT Analysis

SWOT analysis is useful in many instances for encouraging understanding of an organisation's position.

Strengths	These are the elements that make the organisation stand out from the competition. Knowing the strengths of the organisation enables the project to concentrate on these factors to enhance successful project delivery.
Weaknesses	Understanding the weaknesses of the organisation enables the identification of those areas of the project that need to be outsourced or which will best be accomplished through a joint venture or partnership / alliancing approach. Knowing the weaknesses also provides a platform for improvement.
Opportunities	Identifying opportunities gives rise to the potential for additional benefits to be realised from the project initiatives.
Threats	Understanding threats need not provide an aura of doom and gloom. Rather the threat should be seen as giving rise to opportunity. In addition, understanding threats provides insight into the risks to which the project may be exposed.

PESTLE Analysis

‘PESTLE’ analysis may help to establish influences during the concept stage:

Political	Consider internal as well as external politics – why do some stakeholders support your project initiatives and others do not? What are the hidden agendas? What if there is a change in central government or in the senior management of the organisation?
Economic	Consider aspects such as exchange rates, inflation, procurement policies and procedures; commercial terms and conditions; type of contract; contract payment terms.
Sociological	This includes elements such as stakeholder analysis; consideration of local culture; interaction with normal social order; the project team and the continued motivation of the team.
Technological	Consider the following – does the technology for the solution exist, or does it still have to be developed? Do we have the skill and capability to develop or implement the technology? Can the solution be built, operated and maintained? What are the technical interface requirements?
Legal / Regulatory	This includes things such as local laws, by-laws and regulations, including consideration of regional, national and international laws applicable to the project delivery.
Environmental (Ecological)	The birds and the bees and the flowers and the trees – consider SSSI, heritage sites and aspects such as this. The carbon footprint created by the project’s activities will also be a key consideration.

PESTLE acts as a prompt list for consideration of the project environment. These categories help frame what is important and what can be discounted. Such an analysis and categorisation may also have inputs into other areas of project definition and development, particularly around risk management.

When considering stakeholder needs it is important, as it is during all aspects of the project, to be fully informed and aware of the environment within which the project is being delivered.

Other factors that may also need to be taken into account include:

- the commercial sector, i.e. construction, IT, engineering, pharmaceuticals etc.
- international work – perhaps with multiple geographical locations and operational languages
- regulated environments where outputs, outcomes, benefits and the way work is performed must conform to specific standards
- the public sector and the need for accountability and transparency.

Reflecting on all these factors, it is evident that these can occur in multiple combinations and each will have a unique effect on the way in which the project, programme or portfolio is defined, developed and managed.

Operations Management (APM BoK 1.2.2)

“Operations management relates to the management of those activities that create the core services or products by an organisation.”

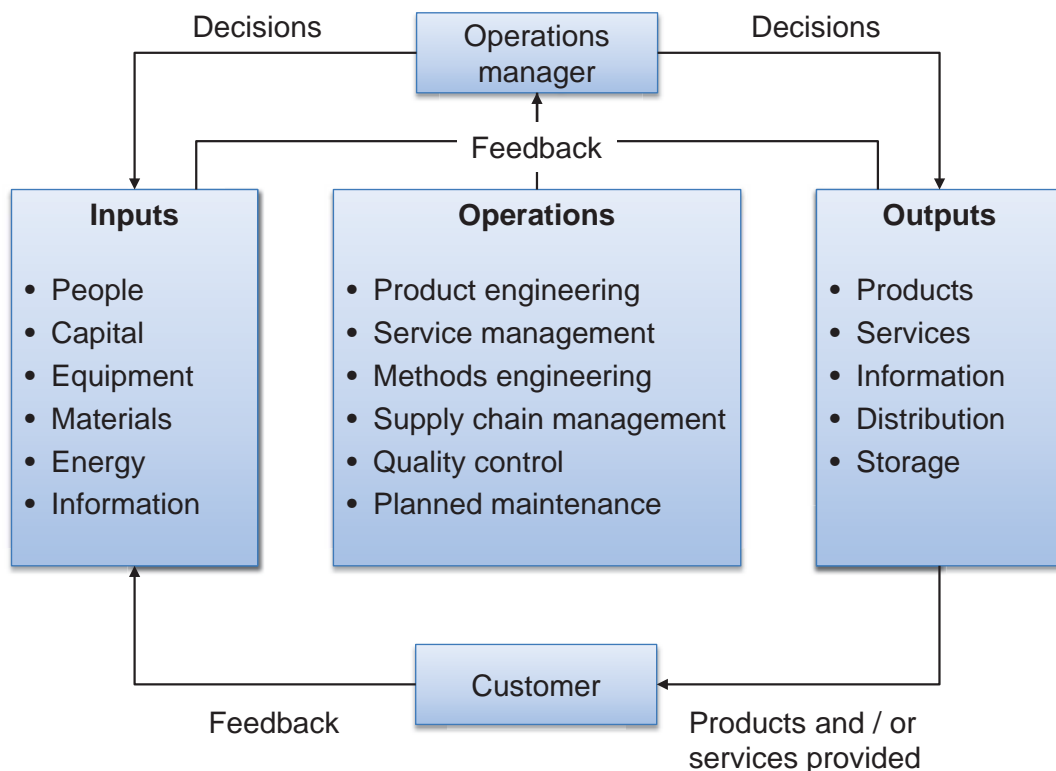
APM BoK 6th Ed.

Service based organisations have adopted the principles of operations management developed for product based industries, e.g. manufacturing and engineering.

In the context of project management, operations management is viewed as the activity that is affected by, but does not form part of, a project.

Operations management is concerned with managing routine activities, performing ongoing activities that produce the same product or provide a repetitive service, while project management implements change. Operations management is thus often seen, from a project perspective, as ‘business as usual’.

Operations management deals with converting inputs into outputs under management control. The following diagram attempts to portray the possible components of operations management.



Operations management as a science is a vastly detailed topic, however it is important that the project manager understand the differences between projects and operations. Both are supported by disciplines such as HR management, finance, legal, marketing, IT support etc.

The delivery of the routine products and services fulfil the strategic mission of the organisation and the expansion or improved efficiency and effectiveness within business as usual constitutes the benefits of a project, programme or portfolio.

A characteristic of a project is that it brings about change. As a result, the project manager needs to work closely with operations management to bring about change that becomes a routine activity. The interaction between the project and operations is crucial too from the point that the impact from the project on business as usual activities needs to be minimised.

At the policy level a series of plans set out the principles of how each aspect of the project work will be managed. These plans include documents such as the risk management plan, quality management plan and benefits management plan. These are sometimes referred to as strategies and include setting out procedures and processes for each management aspect. These further list preferred techniques, including document templates and defined responsibilities.

Project Characteristics (Projects v Business-as-Usual)

Projects exhibit many common characteristics irrespective of their size, cost or duration. These characteristics include:

- projects introduce change (which in turn involves uncertainty)
- they are temporary or transient in nature, each project having a defined start and finish point
- they have an element of uniqueness
- projects create specific results or products with their objectives typically being measured in terms of time, cost and performance / quality parameters
- projects deliver outputs that enable BaU to gain benefits
- they follow a life cycle made up of specific phases
- they comprise complex interrelationships and are often cross-functional in nature
- the cost of changing any of the project's objectives rises faster as completion nears
- stakeholder influence, risk and uncertainty is typically highest at the start of the project.

These characteristics can be contrasted with business-as-usual (or operational) activities:

Project	Business as usual
Defined timescale with a definite end	On-going. Iterative in nature
Unique. Essentially non-repetitive in nature	Repetitive
Introduces step-change	Remains stable. Any changes are incremental
Transient team	Dedicated constant team
Complex inter-relationships	Defined relationships (single discipline?)
Accepts high degrees of uncertainty – risk tolerant	Demands high degree of certainty – risk averse
Generally phased for ease of management	May be a phase in its own right
Delivers outputs	Uses the outputs to deliver outcomes and benefits
Specific aims and objectives to be satisfied. Manages time, cost and quality to achieve them.	Works within fixed time cost and quality constraints

In addition to the above characteristics, it is also useful to consider the role of the project manager as opposed to that of a functional manager. Project managers are faced with many challenges not least of which is that their level of authority may be limited, as might their knowledge of the individual team members and their respective skill sets.

Programme Management (APM BoK 1.1.2)

“Programme management is the co-ordinated management of projects and change management activities to achieve beneficial change.”

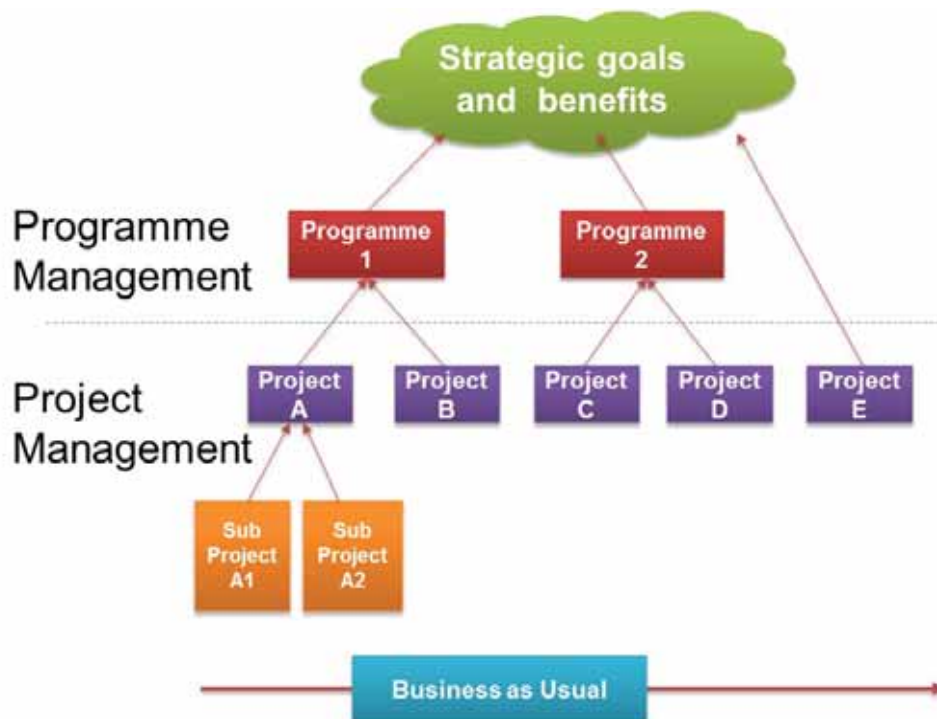
APM BoK 6th Ed

“A programme is a temporary flexible organisation structure created to coordinate, direct and oversee the implementation of a set of related projects and activities in order to deliver outcomes and benefits relating to an organisation’s strategic objectives. A programme may have a life that spans several years.”

MSP® (2007)

Characteristics of Programme Management

A programme emanates from a vision of a changed organisation and the benefits that will be derived from the changed organisation. This will require the co-ordinated delivery of a number of projects and ensuring that their outputs are used to derive the perceived benefits.



Core programme management processes include:

- **Project co-ordination:** this requires the identification, initiation, acceleration, deceleration, redefining and terminating of projects within the programme. This includes managing the interdependencies between the projects and between projects and business as usual activities. A programme will comprise a number of projects that will deliver outputs such as a building, a web site, a process or any number of specifiable products. These will all be project managed within the traditional constraints of time, scope and cost.
- **Transformation:** (or strategic business change): The outputs of the projects must be used to create outcomes and thus deliver the agreed benefits. This does not happen automatically and may require changes to working practices, culture or both. Programmes must encompass business change management and this may include taking temporary responsibility for some business-as-usual activities.
- **Benefits management:** Benefits accrue from the effective use of the outputs of the projects. The purpose of a programme is to deliver these high-level benefits which will ultimately help satisfy the strategic objectives of the organisation. Effective benefits management, which includes defining, quantifying, measuring and monitoring, will help ensure that the management of projects and the management of business change are both fit for purpose.
- **Stakeholder management and communications:** Because a programme coordinates projects in order to deliver beneficial change, it is vital and a key element of the governance of project management that stakeholders relationships are developed and maintained, enabling productive communications with all key stakeholders. This will generate their trust and commitment to the project and aid effective decision making within the organisation.

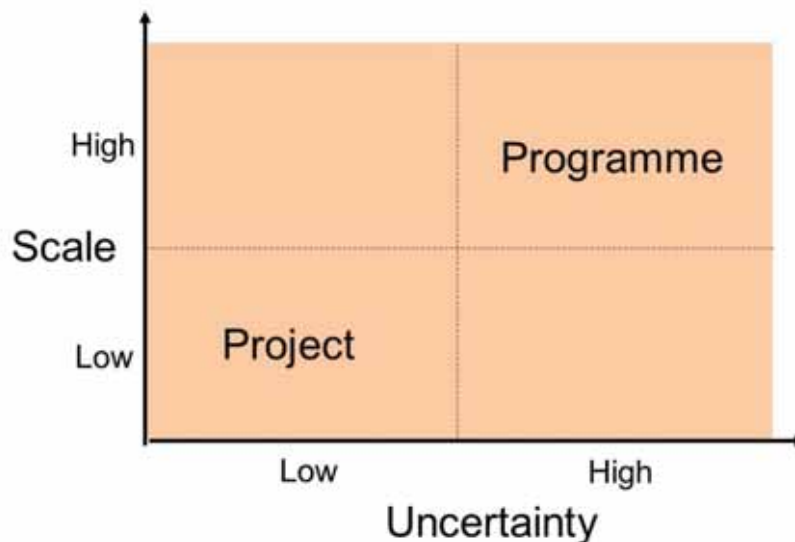


The Distinction Between Project and Programme Management

“The distinction between projects and programmes is that projects typically produce or change something and are then disbanded. The benefits of the undertaking are likely to be accrued after the project is completed. Programmes are typically used to help transform organisations. Therefore, the temporary programme organisation tends to have a lifespan that covers the realisation of the benefits – which could be several years.”

PRINCE2® (2009)

PRINCE2® is a Registered Trade Mark of the Office of the Cabinet Office



Typical Programme Manager Roles and Responsibilities

The programme manager is likely to be involved in the following activities:

- helping to initiate, prioritise and terminate projects. This is likely to include significant involvement in the creation and/or approval of project business cases and the sign-off of project completion
- managing the interdependencies between projects (including their respective outputs) and between projects and business-as-usual
- managing specific resources across the projects and identifying resource conflicts, ultimately deciding on where they should be prioritised
- managing risks, issues and controlling change thereby ensuring a holistic overview of their impact across the programme
- defining and realising strategic benefits, ensuring that individual projects remain aligned with the strategic objectives of the programme.



Role	Responsibilities	Principal Tasks
Programme Sponsor	Aligns the programme with strategic aims. Manages business risk and delivers the business benefits	Scopes the programme; supplies funding; sets programme success criteria; reviews progress and priorities. ‘Champion’ for the programme objectives
Programme Manager	Delivers the programme objectives. Ensures uniformity and optimum use of resources across the projects. Ensures that the benefits are realised, manages project risks and stakeholders.	Plans the programme; integrates individual projects and their interfaces within the programme; prioritises resources; manages programme risks

Benefits of Programme Management

By looking at the types of situation that programme management is suited to, we can better understand its strengths.

- Scale: It is the case that larger initiatives are more likely to be programmes. But there are also plenty of examples of mega-projects (often in construction) that are bigger than many programmes. A programme management infrastructure will be more expensive and it shouldn’t be justified on scale alone.

- **Uncertainty:** The programme management approach is better designed to deal with uncertainty. Programmes often have a vision of the end result but cannot specify in detail how to achieve that vision. By their very nature, programmes are affected by many external influences and need to be flexible in their path to achieving the vision.

Programme management also offers:

- more effective prioritisation of individual projects based on their respective contribution to the programme objectives
- efficient and effective management of resources (including sharing of overheads) and better prioritisation of scarce resources
- consistent view of interdependencies between multiple projects and business-as-usual (which may also enable the spreading of knowledge and best practice)
- the ability to manage risk issues and changes more completely, imparting a holistic view of activities and the relevant merits of alternative courses of action
- improved response to changing circumstances (for example, it may not be possible to define all projects in detail at the outset of the programme)
- more effective communication due to consistent reporting and escalation processes in addition to a single point-of-contact
- equal focus on how projects contribute to the programme objectives as opposed to only concentrating on each individual projects' time, cost and quality success criteria.

Challenges of Using Programme Management Within an Organisation

- Programmes may not have a clear view of the end of the programme at the start, unlike projects which, by definition, need to scope the entire range of deliverables, as well as cost and time criteria. Therefore programmes may need to develop their range of constituent projects as they proceed
- programmes may need to continually align the individual project business cases with the overall strategic business case which is heavily influenced by a dynamic business climate
- programmes typically involve a much greater number of stakeholders, many of which are likely to have competing objectives
- competing inter-project priorities and especially BaU can cause significant conflict.
- a programme life cycle is different from a project life cycle. A programme is unlikely to have a linear cycle as it undergoes a continuing cycle. It is less obvious where the end point is and it may undergo a series of regenerations, delivering benefits along the way
- the nature of programmes varies from industry to industry and therefore their definition and management can vary widely between different organisations.

Portfolio Management (APM BoK 1.1.3)

“Portfolio management is the selection, prioritisation and control of an organisation’s projects and programmes in line with its strategic objectives and capacity to deliver. The goal is to balance change initiatives and business as usual while optimising return on investment.”

APM BoK 6th Ed

Organisations must have the ability to manage a range of programmes, projects and business-as-usual activities concurrently. Collectively this is referred to as a portfolio. Many projects that are undertaken to create new products and services are governed as part of a portfolio.

Portfolios can involve the introduction of many additional relationships between programmes, their relevant projects, many stand-alone projects and the organisation context and how it relates to BAU. It is therefore important that a project manager understands the specifics of the portfolio, its structure and its requirements in respect to how best to manage their own related project.

A single organisation can have a single portfolio or a collection, for example by product type, market sectors or group of customers. The selection and choices made with respect to the individual projects and programmes within a portfolio are driven through the application of specific corporate governance.

By virtue of the need to manage at this corporate level, the organisation can impose the standardisation of its reporting, appraisal, resourcing and prioritisation issues.

The portfolio management process must constantly review the balance of investment and benefit, creating and closing projects and programmes as necessary. This includes prematurely closing projects or programmes where they are no longer viable.

Key Activities in Portfolio Management

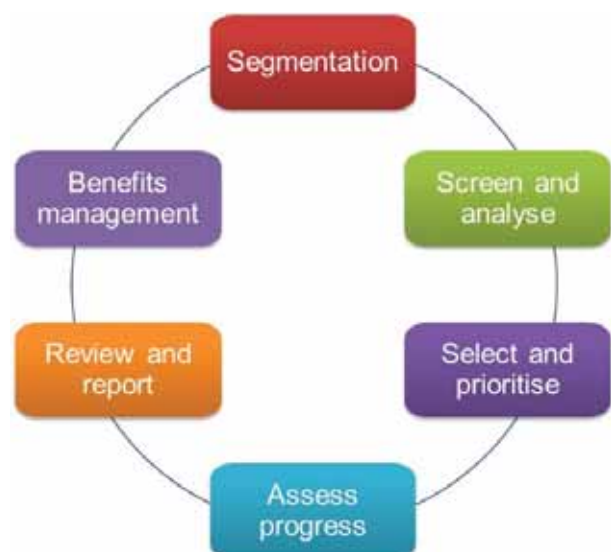
There are differences of opinion as to what constitutes portfolio management. However, the common theme is that portfolio management within the context of project management involves:

Segmentation

- segmenting the portfolio into categories and tailoring the investment criteria accordingly

Screen and analyse

- screening, analysis and financial appraisal of project and programme characteristics (resources, schedules, cash flows, risks, benefits and so on) in relation to the organisation’s strategy



Select and prioritise

- selection and prioritisation of projects and programmes within the organisation's portfolio, given the resources available, likely returns and risks

Assessing progress

- continued monitoring of the portfolio characteristics as projects and programmes develop

Review and reporting

- periodic review of the performance of the portfolio and adjustment with regards to the constraints, risks and returns anticipated, and in the light of developing circumstances around the portfolio

Benefits management

- establishing and maintaining a consistent approach to the tracking, realisation and reporting of benefits across all projects and programmes within the portfolio.

Benefits of Portfolio Management

At an organisation level, portfolio management helps bring about the following benefits:

- maintaining a balanced and strategically aligned portfolio in the context of changing conditions
- improved delivery of projects and programmes through a portfolio-wide view of risk, dependencies and scheduling to reflect the capacity of different parts of the organisation to absorb change
- reduced costs by removing overlapping, poorly performing and non-strategically aligned projects and programmes
- more efficient and effective use of limited resources, by matching demand and supply and optimising allocation of available resources
- increased realisation of forecast benefits and the identification and realisation of unplanned benefits to create additional value



The realisation of these benefits depends upon repeatable processes that are supported by:

- a clearly defined and articulated strategy
- senior management commitment to and effective championing of the portfolio management processes to ensure that stakeholders collaborate in pursuit of shared goals
- a clear governance structure that is understood by stakeholders
- a portfolio management office function to provide impartial and credible analysis and decision making support to the portfolio team along with support to the projects and programmes

Where an organisation's portfolio(s) is supported by good governance, an opportunity is created to improve, in a consistent manner, the management of projects and programmes. A portfolio that is well managed, provides the structure and commitment required to improve the maturity of an organisation.

Differences Between Programme management and Portfolio management

In the corporate context, programme management sits between portfolio management and project management. There are many similarities between programme and portfolio management although portfolios are arguably, even more concerned about the identification and management of resource conflicts. Portfolio management also has a greater governance responsibility and must ensure that the portfolio has an appropriate mix of high-risk / high-return activities as well as activities that will ensure the continuing viability of the organisation.

Portfolio Management

A portfolio is a collection of projects, programmes and business-as-usual activities designed to meet an organisation's long term strategic goals. Portfolio management looks after the links between different programmes and projects, prioritises between them and balances the corporate resources across them.

Programme Management

Programmes are designed to meet medium term goals and comprise a number of projects that are co-ordinated by the programme management team.

Project Management

Projects deliver clearly specified outputs that either contribute to the objectives of a programme or contribute directly to the objectives of the portfolio.

Projects, Programmes and Portfolios

	Project	Programme	Portfolio
SCOPE	Projects have a narrow scope with specific deliverables	Programmes have a wide scope that may have to change to meet the benefit expectations of the organisation	Portfolios have a business scope that changes with the strategic goals of the organisation
CHANGE	The project manager tries to keep change to a minimum	Programme managers have to expect change and even embrace it	Portfolio managers continually monitor changes in the broad environment
SUCCESS	Success is measured by budget, on time and products delivered to specification	Success is measured in terms of Return on Investment (ROI), new capabilities and benefit delivery	Success is measured in terms of aggregate performance of portfolio components and achievement of strategic objectives
LEADERSHIP	Leadership style focuses on task delivery and direction in order to meet the success criteria	Leadership style focuses on managing relationships and conflict resolution. Programme managers need to facilitate and manage the political aspects of stakeholder management	Leadership style focuses on adding value to portfolio decision making
TEAM	Project managers manage technicians, specialists etc.	Programme managers manage project managers	Portfolio managers may manage or co-ordinate portfolio management staff
APPROACH	Project managers are team players who motivate using their knowledge and skills	Programme managers are leaders providing leadership and vision	Portfolio managers are leaders providing insight and synthesis
PLANNING	Project managers conduct detailed planning to manage the delivery of the project products	Programme managers create high level plans providing guidance to projects where detailed plans are created	Portfolio managers create and maintain necessary process and communication relative to the aggregate portfolio

	Project	Programme	Portfolio
CONTROL	Project managers monitor and control tasks and the work of producing the project products	Programme managers monitor projects and ongoing work through governance structures	Portfolio managers monitor aggregate performance and value indicators

4. Governance and structured methodologies

Coverage of Learning Outcomes:

- Principles of governance of project management
- Methods and procedures to support governance
- Advantages of using structured methodologies.



Project Management (APM BoK 1.1.1)

“Project management is the application of processes, methods, knowledge, skills and experience to achieve the project objectives. .”

APM BoK 6th Edition

APM defines a project as:

“A unique, transient endeavour undertaken to achieve planned objectives, which could be defined in terms of outputs, outcomes or benefits.”

APM BoK 6th Edition

In essence, projects bring about change. Project management is recognised as the most efficient way of managing such change. The concept of a 'project' means different things to different people, and may also reflect different frames of reference. A project has a specific start point and end point, specific objectives and specific resources assigned to perform the work. The project manager should have overall responsibility and authority over a project and when the objectives have been met, the project is considered complete.

Reasons for Project ‘Failure’

Projects have multiple stakeholders who will all have their own interests and expectations as to what constitutes a successful project – and by implication, an unsuccessful project. It is sometimes tempting to think that projects are straightforward and relatively easy to manage. The truth of the matter is that projects are often very complex and difficult entities to accomplish successfully.

According to a study by the Standish Group, a significant portion of the \$250 Billion spent annually on IT projects is wasted due to poor project management practices (source: ‘PM Network’ magazine October 2002):

- 31% of all projects are cancelled before completion
- 88% of projects run over schedule, budget or both
- for every 100 projects started, 94 are restarted
- average overrun cost is 189% of original estimate
- average time overrun is 222% of original estimate.

Multiple reasons exist for these issues and significant research has gone into identifying common reasons for project failure.

‘Triple’ Constraints of a Project

The three most common words in project management are time, cost and quality (or sometimes performance). These are usually referred to as the ‘triple constraints’ (or sometimes as the ‘triangle of balance’). In order to increase the likelihood of a successful project, each one of these parameters needs to be defined and monitored.

Very often the gain in one constraint entails a compromise in another. For instance, if a project manager attempts to complete a project in a very short time period, it will typically increase the budget and/or compromise aspects of quality or performance or both.



Although projects are generally expressed in terms of requirements for all three criteria, there will be a hierarchy amongst them. It is important that the project manager is aware of this relative hierarchy since it will contextualise many of the decisions they will be obliged to make. It is important that this understanding is

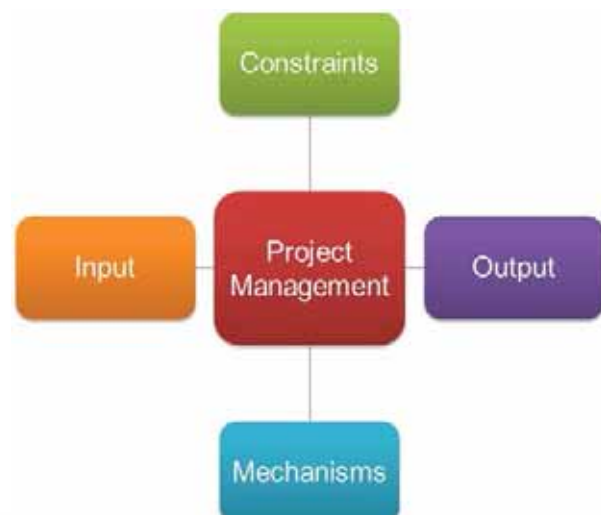
consistent with the wishes of the Sponsor and other key stakeholders.

Note that other constraints may also be relevant. These may include benefits, resources, risk and arguably most important of all for many organisations, health and safety.

Project Management Process – Integration

Project management provides the central point of integration required to deliver the project successfully. This will involve the co-ordination of the following factors:

Inputs: the business justification for the project based on the identification of a specific need, problem or opportunity



Outputs: the project deliverables for the product or service being developed

Constraints: as previously discussed, these will include time, cost, quality and other parameters

Mechanisms: the people, tools and processes that will be used to deliver the project

Project Processes v Life Cycle Phases

Certain activities are common to all projects. Many of these processes will be iterative and repeat throughout each phase of the project life cycle. These include the following steps:

- **Starting** – each phase needs to be initiated and the justification required undertake the phase needs to be defined and agreed
- **Defining** – each phase needs to be planned and its outputs clearly defined
- **Monitoring** – the execution of the phase needs to be monitored and where appropriate, corrective action applied
- **Learning** – each phase needs to be closed out and lessons should be learned to ensure similar problems do not surface in the next phase and that positive outcomes can be emulated in future phases

Each project phase is marked by the completion of one or more deliverables. A deliverable is a tangible, verifiable work product such as a feasibility study, a detailed design, or a working prototype.

It would be a mistake however to assume all project management processes are wholly linear, (i.e. the task is done once and never repeated). Many tasks are constantly repeated during the project. Estimation of project budget for instance is performed continuously, it is an iterative process. Successive iterations perform the same task but with a higher degree of confidence and accuracy each time.

This is especially true of large projects where each phase would have its own set of starting, planning, controlling and closing activities. For example, it may be necessary to formally close the feasibility phase before the design work can commence.

Benefits of Project Management

Good project management has been proven to be an effective and efficient way of managing change in many types of organisations though:

- common, consistent approach:
 - leads to better understanding of the delivery processes for each team member and increased credibility for the performing organisation
- structure:
 - large complex problems can be better structured through the introduction of a phased approach with pre-defined inputs and outputs
- improved monitoring and control of activities:

- a structured, phased approach ensures that project activities can be objectively measured against a clear baseline
- better decision making:
 - a common approach provides information to stakeholders in a timely fashion thereby allowing informed decisions to be taken with a better understanding of the associated risks
- resource management:
 - formal project management allows scarce resources to be prioritised towards key objectives (both within and across multiple projects)
- governance:
 - formal project management will mean that it is more likely that projects are delivered in a controlled sustainable manner
- learning from experience:
 - the organisation's project management approach should evolve over time, thereby better meeting the organisation's specific needs
- communication:
 - formal and consistent reporting mechanisms mean that stakeholders are more likely to have a common understanding of the present project status and concerns
- project success:
 - ultimately, a formal approach should increase the chances of the project being delivered within the agreed time/cost/quality constraints with a better chance of the benefits being realised

Challenges when using Project Management

The introduction of formal project management processes within an organisation is unlikely to be without its own set of specific challenges. Like any major new business process, introducing formal project management is likely to involve significant change to accepted ways of working and resistance from many individuals who are comfortable with the existing ways of working is inevitable. Common challenges might include the following factors.

Factor	Description
Bureaucratic	The effort required to formally document the justification, plan and status for the project is often seen as an expensive waste of time and resource
Limits creativity	Team members may argue that adopting formal processes limits their technical ingenuity and vision – others will argue that it is only when constraints are placed upon us, that we can truly be creative
Threatens existing organisation structure	Functional managers may have a specific concern that their authority and control of resources is being questioned, especially with the introduction of a separate project manager
Complex inter-relationships	Projects often involve the integrated effort of several different disciplines; the additional communication and interaction involved may cause significant confusion and conflict due to different and competing priorities
Project management capability	Project management (including project sponsorship) are skills in their own right - individuals need to be fully conversant with the hard and soft skills required to successfully deliver projects

Project Management Method

“Methods and procedures detail the standard practices to be used for managing projects throughout a life cycle. Methods provide a consistent framework within which project management is performed. Procedures cover individual aspects of project management practice and form an integral part of a method.”

APM BoK 5th Ed.

A key component of any organisations’ governance of projects will be the method that they adopt to ensure the controlled and consistent management of their project portfolio. Organisations will select and tailor a method to best meet their specific business needs.

Contents of a Method

A formal project management method is likely to include the following content.

Content	Description
Guidelines on application and flexibility	It is unlikely that any single method is going to be suitable for all projects all of the time in an organisation. A project method should include guidelines on, for example, which parts of the method are mandatory and which are optional; this might depend on the type of project, scale (duration or cost) or level of complexity.
Process inputs and outputs	The relevant inputs and outputs for each stage of the project should be documented thereby allowing an agreed and effective handover between succeeding stages.
Documentation templates	Guidelines and templates for project documentation will help to ensure that consistent and clearly understood control mechanisms are used throughout the life cycle.
Governance guidelines	A formal method will help the organisation comply with constraints related to the accountability, decision-making, reporting and overall management of projects.
Role definitions	The roles, responsibilities and performance criteria applied to the key project roles will be documented (including those of the sponsor, project manager, team members etc.)
Project management procedures	Project specific procedures such as risk management, quality management, change control and communication processes will form an integral part of any formal project management method.

Project Methods: Benefits and Costs

Formal project management methods have some obvious benefits for any organisation but they are not without their critics. Commonly cited benefits and costs include:

Benefits	Costs
<p><i>Consistent terminology:</i></p> <p>A consistent use of terminology in project management leads to more efficient project execution, better decision-making and easier cross-functional and cross-site team-working.</p>	<p><i>Additional bureaucracy:</i></p> <p>Project managers and team members often complain about the additional documentation and other paper-work that is often associated with a project method.</p>
<p><i>Understanding of Roles:</i></p> <p>A common understanding of roles and responsibilities helps prevent duplication of effort and/or activities not being undertaken correctly.</p>	<p><i>Scalability:</i></p> <p>Some organisations try to adopt exactly the same method for all projects irrespective of the magnitude of the project. It is important that methods exert an ‘appropriate’ level of control on projects.</p>
<p><i>Consistent documentation:</i></p> <p>When all projects use the same documentation this enables consistency between projects, thereby providing efficiency, increased understanding, better decision making (e.g. through better reporting), more appropriate engagement of stakeholders, improved communication throughout and continuous improvement.</p>	<p><i>Limits creativity:</i></p> <p>Methods are criticised for mandating unnecessary constraints on the way that project activities are undertaken, thereby limiting the effectiveness and efficiency of the team.</p>
<p><i>Supports the development of new project managers:</i></p> <p>A method can become the basis for new project managers and team members to understand how projects are undertaken and delivered. Learning is more effective when new project managers can see theory in practice.</p>	<p><i>Garbage In / Garbage Out:</i></p> <p>No matter what method is adopted, the project outputs are only as good as the input that is provided. It is argued that problems are often hidden in projects on the assumption that “things must be okay if we are following a formal method”.</p>

Benefits	Costs
<p><i>Staff mobility:</i></p> <p>A consistent method enables team members to move between projects and understand quickly the status of a project, where to find information and contribute to effective management of the project moving forward.</p>	<p><i>Time-consuming:</i></p> <p>In certain organisations, project work is viewed as an ‘add-on’ to daily work and the adoption of a formal method only adds to this extra workload.</p>

The principles of project governance are strongly linked to the adoption of a formal method and these controls must be adopted throughout the project life cycle. Having a consistent method of project authorisation and delivery leads to greater confidence and credibility. Customers, regulatory bodies and other stakeholders are likely to adopt a more favourable view of organisations that have a controlled approach to the management of their projects.

Over time, organisations that have a mature approach to project management should have a method that has evolved in response to lessons learned from previous projects, thereby demonstrating continuous improvement.

Publicly Available Methods and Best Practice

Whatever method is chosen by the organisation, its creation and/or implementation will often fall under the auspices of the project office. The project office may adopt or modify publicly available methods or best practice to best meet the needs of the business. Examples of publicly available methods and best practice include:

- PRINCE2®: A very widely used method that originated in the management of UK government IT projects. It is still widely adopted in the management of public-sector projects in addition to certain areas of the private sector.
- Project Management Institute (PMI) Body of Knowledge: The PMI does not advocate a project management method but it does provide a framework of processes, knowledge areas and tools / techniques that can be used to better manage projects
- BS6079: British Standard guidelines for the effective and efficient management of projects.

Governance (APM BoK 1.1)

“Governance refers to the set of policies, regulations, functions, processes, procedures and responsibilities that define the establishment, management and control of projects, programmes and portfolios.”

APM BoK 6th Ed.

“Corporate governance involves a set of relationships between a company’s management, its board, its shareholders and other stakeholders. Corporate governance also provides the structure through which the objectives of the company are set, and the means of attaining those objectives and monitoring performance are determined.”

OECD Principles of Corporate Governance 2004

The Governance of Project Management is the organisation’s governance controls and measures that directly relate to project management. Governance of Project Management is achieved in varying degrees via a wide variety of controls and measures from organisation to organisation.

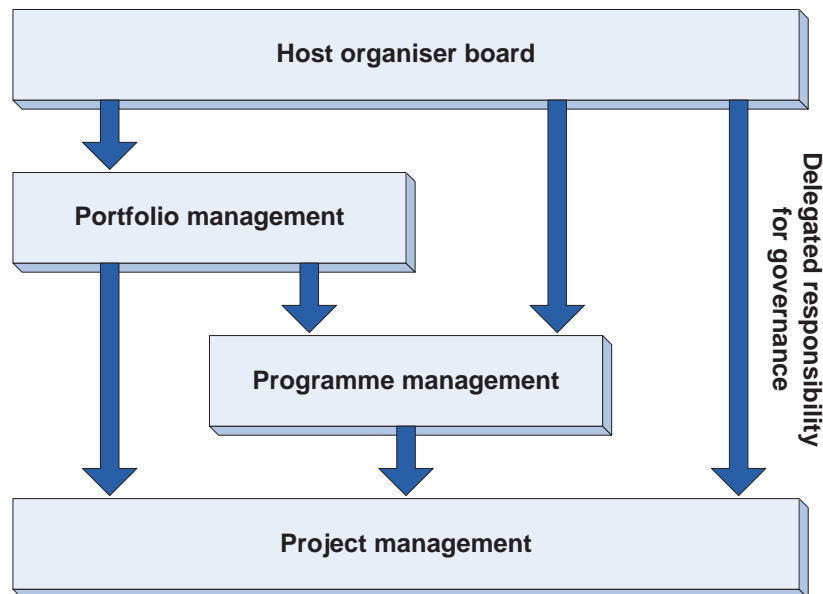
Governance is needed to ensure that projects are aligned to the organisation’s objectives including corporate governance requirements, and that they are delivered efficiently and do not adversely impact on BAU activities.

Governance of project management is a responsibility of corporate management requiring the support of project sponsors, project managers and project teams. The Governance of Project Management is based around four main components:

- Portfolio direction
- Project sponsorship
- Project management
- Disclosure and reporting.

The diagram shown below illustrates that governance starts with the host organisation whose board must ensure that projects, programmes and portfolios are properly managed. The board sets the standards applied by a portfolio to the component programmes and projects and a programme is responsible for applying standards to component projects.

In less mature organisations where central governance is not in place, the project manager and the project team will have to take responsibility for governance of project management themselves.



Principles of Project Governance

Best results from Governance of Project Management will come from the intelligent application of a full set of principles, combined with proportionate delegation of responsibility and the monitoring of internal control systems.

Good governance can be demonstrated through:

- the adoption of a disciplined life cycle governance that includes approval gates at which viability is reviewed and approved
- recording and communicating decisions made at approval gates
- the acceptance of responsibility by the organisation's management board for project, programme and portfolio governance
- establishing clearly defined roles, responsibilities and performance criteria for governance
- developing a coherent and supportive relationship between business strategy and projects, programmes and portfolios
- procedures that allow a management board to call for an independent scrutiny of projects, programmes and portfolios
- fostering a culture of improvement and frank disclosure of project, programme and portfolio information
- giving members of delegated bodies the capability and resources to make appropriate decisions
- ensuring that business cases are supported by information that allows reliable decision-making
- ensuring that stakeholders are engaged at a level that reflects their importance to the organisation and in a way that fosters trust

- the deployment of suitably qualified and experienced people
- ensuring that project, programme and portfolio management add value.

Where a joint venture between two or more organisations is put in place, there should be:

- Formally agreed governance arrangements covering unified decision-making and joint authority for managing contacts with owners, stakeholders and third parties
- Jointly agreed business cases that reflect the apportionment of risk and reward
- Arrangements for governance that take account of existing governance and the technical strengths and weaknesses of the co-owners
- Approval gates that give the owners the opportunity to re-evaluate their participation
- Agreed procedures for reporting, independent reviews and dispute resolution

There is no single set of defined controls and measures for the Governance of Project Management appropriate for every organisation. However, the controls and measures in place should fulfil the requirements of the principles stated earlier in this text.

The project sponsor is responsible for ensuring that adequate governance mechanisms are in place for project management. Periodically checking that these are in place and being applied is part of project assurance activities. This should be performed by someone external to the project team and who reports to the project sponsor.

Virtually all the topics in the Body of Knowledge contribute to good governance. Key areas that should be considered, include:

- Project, programme and portfolio management – the methodologies that deliver the projects, programmes and portfolios – the level of definition, reflection of current best practice and the way in which they contribute to project delivery and business success
- Knowledge management – the ability of the organisation to capture, develop and improve delivery capability
- Life cycle – the structure underpinning delivery at all levels within the organisation
- Maturity – the development of increasing levels of capability
- Sponsorship – the link between projects, programmes and portfolios, strategic management and business as usual
- Support – the support environment that provides project managers with consistency of practice

Benefits of Governance of Project Management

Effective governance of project management will ensure that the organisation's projects are aligned to organisation's strategic objectives, delivered efficiently and are sustainable. Benefits of good project governance include:

- optimisation of investment
- avoidance of common reasons for project failure
- motivation of staff through better communication
- minimising risk arising from change
- maximising the benefits derived from the changed environment.

Specific benefits are detailed in the following table:

Benefit	Description
Optimise portfolio	Senior management must ensure that each project has a viable business case and that risk is shared across its project, programmes and business-as-usual activities
Minimise risk	As well as ensuring that each project has an approved plan with agreed authorisation points, clearly defined reporting and escalation criteria will help ensure that senior management are fully aware of the risk associated with their portfolio
Assure growth	More informed decision making should help assure the long-term viability and continued growth of the organisation
Stakeholder confidence	Shareholders, funders, customers and suppliers will all have more confidence in an organisation that is seen to have a robust governance framework in place
Better decisions	Governance principles should provide the key stakeholders with the necessary information to make important decisions regarding the viability of projects, the likely achievement of strategic objectives and the need for corrective action
Compliance	A robust set of governance principles will help ensure that the organisation complies with relevant corporate governance legislation and guidelines (for example – the UK Corporate Governance Code; Sarbanes Oxley (USA) or the Combined Code)

5. Communication

Coverage of Learning Outcomes:

- communication plan, barriers to communication
- importance of effective communication
- conflict management
- negotiation.



Communication (APM BoK 2.1.1)

“Communication is the means by which information or instructions are exchanged. Successful communication occurs when the received meaning is the same as the intended transmitted meaning.”

APM BoK 6th Edition

Communication takes place in many ways. It can be verbal or non-verbal, active or passive, formal or informal, conscious or sub-conscious. The way in which communication takes place affects the understanding and feelings, both of which impact the meaning received.

The objectives of the communication process are to:

- keep a high level of awareness and commitment
- ensure that expectations do not deviate out of line with what will be delivered
- explain what changes will be made and when these will be effected
- describe the desired future outcome.

Effective communication requires attention to four key elements:

- stakeholder identification and analysis to establish the target audience
- the clarity of the message in order to ensure relevance and in accordance with the GoPM to foster trust and commitment
- a system for message delivery in order to ensure that the appropriate message is provided to the appropriate stakeholder at the appropriate time in the project
- a system of monitoring and feedback to assess the effectiveness of the communication process.

The main media used to communicate include, but are not limited to:

- oral, face to face – the most successful and media rich communication method and is achieved through vocal (words), verbal (the way the words are spoken) and visual (body language and hand gestures)
- oral, not face to face – typically telephonic in nature, but misses the visual impact
- visual – this could be through displays and exhibitions
- electronic – the use of the internet proliferates and the use of email can be limited. websites can incorporate visual images as well as words and web meetings are an excellent alternative to face to face meetings
- written – typically letters, newsletters, reports, notice boards and posters spring to mind, but this approach is limited to using words and visual images.

Positive and Negative Factors Affecting Communication

There are many factors that affect communication. They can include physical, psychological, cultural and technical.

Some of the specific factors are:

Factor	How it affects communication
Clarity of ideas	<p>Having good understanding of what you want to communicate is a key factor in the recipient's understanding. If you don't know what you mean how can they?!</p> <p>Poor structure leads to difficulties in picking out the important points.</p> <p>The project manager can ensure that the main messages are highlighted and repeated as necessary throughout the communication</p>
Purpose	<p>What are you trying to achieve? Instruction or direction? For information? To get a decision? To persuade or influence? Consider the true purpose of the communication and how it is best highlighted and achieved.</p>
Environment	<p>Noise, temperature and comfort fall into this category. They affect not only the ability to communicate but also the enthusiasm of the participants.</p> <p>Other factors in this category, which may have an effect, include location, presence of other people and the immediate surroundings (i.e. cramped or spacious, tidy or messy).</p> <p>The environment affects all parties to the communication but in different ways. It is important to be sensitive to how others are reacting to their environment and, if it is having an adverse effect, try to remedy the problem.</p>
Background	<p>It can be helpful to get some background information on the other party. Consider their role, experience and knowledge, communication preferences and what their expectations or prejudices may be.</p> <p>Social and cultural differences must also be carefully considered especially in an international context. The project manager needs to account of cultural differences in interpretation.</p> <p>Understanding the audience and their level of understanding, knowledge and capability, as well the culture of the audience will help overcome this barrier</p>

Delivery	<p>Poor structure leads to difficulties in picking out the important points.</p> <p>Be aware of tone and body language as well as the basic content of the message.</p> <p>The project manager can ensure that the main messages are highlighted and repeated as necessary throughout the communication</p> <p>Timing and personal space are external factors but still a function of the individual.</p>
Usefulness	<p>The recipient of a message is more likely to pay attention when they recognise that there is some way in which they will gain. Considering the 'WIIFM' (What's In It For Me) of the recipient can help to focus the message on the areas to which the recipient will respond.</p>
Follow-up	<p>Support words with deeds. Failing to comply with commitments made can lead to a lack of trust and credibility. Positive communication is reinforced when actions are carried out as agreed.</p>
Listening	<p>There is much that could be written here about listening. Demonstrating active listening is perhaps one of the most effective tools in communication, and failing to listen is often cited as one of the biggest problems.</p>

Communication Plan

The development of a communication plan as a subsidiary plan to the project management plan will assist in ensuring that the appropriate information is provided to the appropriate stakeholder at the appropriate time in accordance with information reporting and management policies.

Communication is a two way process, between a sender and receiver and as such the communication plan must account for the needs for both parties. The development of a project communication management plan should include consideration of:

- **Who needs to receive or send information** – this start with stakeholder identification and analysis of their needs and expectations
- **Why do they need to send or receive the information** – the purpose of communicating the information is important
- **When do they need to send or receive the information** – the frequency of disseminating information and particular deadlines needs to be understood
- **What media is best suited for the sending or receiving** – consideration of electronic versus hard copy must be undertaken

- **What format will be applied to the information sent or received** – particularly when sharing information electronically, the means of accessing the information needs to be understood – there is no sense in sending information in a format that cannot be opened

How feedback is provided or obtained, by ensuring the message sent or received is understood as intended is paramount to effective communication



A simple communication plan could appear as follows:

Audience (who)	Content (what)	Purpose (why)	Sender (who)	Frequency (when)	Format / media (how)	Feedback (how)

Other considerations to include in the plan could be a full record of contact details per stakeholder – this would include aspects such as contact telephone numbers; email addresses; physical address and postal address, as well as alternate contact in the event that the stakeholder is unavailable.

Whatever forms of communication are chosen, it is important that the project manager considers how this information is created, stored, disseminated, archived and destroyed. The different versions of project information will also need to be carefully controlled. These issues dictate that there are very strong links between communication, information management and configuration management.

Benefits of a formal project communications plan

The benefits of effective communication appear to be quite obvious. In a project environment it is vitally important that effective communication takes place and will provide many benefits to the project. Amongst others, these include:

- enhanced understanding of roles, responsibilities and expectations within the team
- appropriate information provided to the appropriate stakeholder at the appropriate time
- reduced potential for conflict due to misunderstanding and misinterpretation
- enhanced confidence within the project team and stakeholder community
- standard, consistent transfer of project information that aids effective decision-making
- higher sense of ownership and commitment within the team

Conflict Management (APM BoK 2.1.2)

“Conflict can be defined as different objectives and attitudes between two or more parties. Conflict management is the process of identifying and addressing differences that, if left unresolved, could affect project objectives.”

APM BoK 6th Ed.

The project environment brings together many different people to achieve the project objectives. This inevitably brings with it degrees of conflict concerning many aspects of what needs to be done, how it will be done, who will do it and what the relative priorities of one course of action over another are etc.

Not all conflict has a negative impact. Where a project manager can support healthy constructive conflict, this will aid team development and support learning experiences.

Common Sources of Conflict

The most frequent causes of conflict in projects are listed below. Although many team members think that personality clashes are a primary source of conflict, the conflict only becomes personal when the problem is not resolved, typically by addressing one of the other sources. It is generally thought that schedule, priorities and resources account for over 50% of all conflict.

Source of conflict within team	Group	Research
Resources		
Costs		
Personalities		
Schedule		
Administrative procedures		
Project priorities		
Technical opinions		

Sources: Thamhain and Wilemon, and Posner

Source	Description
Administration procedures	The paperwork and bureaucracy that often surrounds project work can lead to disagreements over the need for these deliverables and how this might impact “real work”.
Costs	Although team members may personally be less concerned about costs, money does cause conflict between project managers, sponsors, customers, suppliers and other project stakeholders.
Personalities	There will be times when project team members do not get along although these clashes are often the result of conflict caused by one or more of the sources listed above.
Priorities	This may derive from a lack of clarity over the organisation’s strategic priorities as to what gets done and when.
Resources	These are almost always scarce in projects whether the resource is money, labour, resources or other materials.
Schedule	Sponsors, customers and other stakeholders often have unrealistic expectations concerning when deliverables are required. This might lead to disagreements over one or more of the other sources of conflict.
Technical opinions	This conflict can be very difficult for the project manager to resolve especially if they do not have the subject matter knowledge to facilitate the discussion.

Conflict in the Project Life Cycle

Conflict might also be the source of different issues that arise at specific stages of the project life cycle and/or the development stage of the team. Project managers need to identify the true source of each conflict and which stakeholders might be impacted.

Not all conflict is negative and where a safe environment exists, conflict can have a positive impact, as ideas and opinions are constructively challenged in order to obtain a more beneficial final outcome and aids team development. Where conflict is of a destructive nature, this can lead to multiple issues within the project:

- disagreement over a task, objective, decision or action
- conflicting values
- unspoken assumptions
- emotion, including stress, passion, anger, fear, envy and excitement
- ego, perceived power, influence and insecurity

- sense of uncertainty
- miscommunication

Within each phase of the project life cycle specific areas of conflict are likely to be more prevalent:



Phase	Sources of conflict
Concept	<ul style="list-style-type: none"> • Idea – the problem or opportunity that needs to be addressed • Options for the solution • Priority of the project within the organisation • Benefits to be achieved and any downsides (disbenefits) • Funding availability and priority
Definition	<ul style="list-style-type: none"> • Requirements prioritisation • Approach to the solution development • Constraints to be met • Risks to be managed

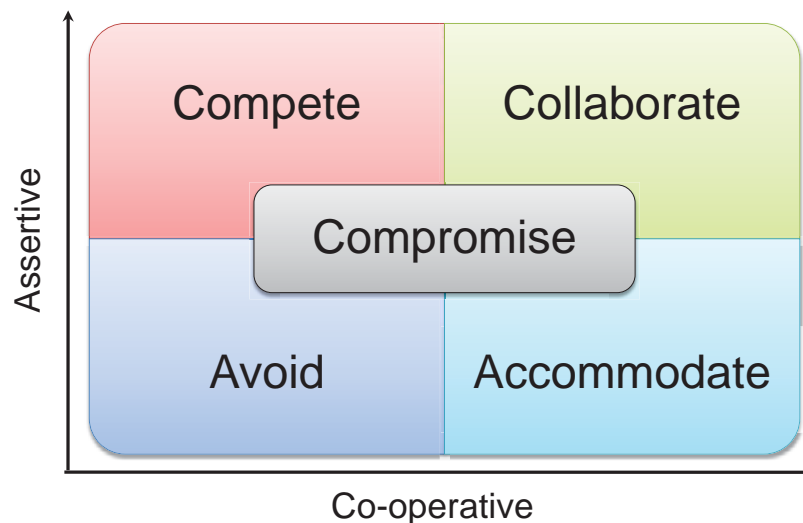
Phase	Sources of conflict
Development	<ul style="list-style-type: none"> • Schedule: the timing and sequencing of project related tasks. • Resources: allocation of project personnel, where to get them and how. • Performance of teams and individuals • Change to the project: e.g. product, budget, timing • Issues
Handover	<ul style="list-style-type: none"> • Acceptance test results and transfer of responsibility • Snags and whether or when they are to be resolved • Lessons learned – blame • Disbanding of team and where they will be redeployed.
Benefits Realisation	<ul style="list-style-type: none"> • Achievement of benefits • Ownership of and responsibility for benefits • Time needed to undertake benefits measurement • Resistance to change and the new ways of working • Corrective actions needed to ensure maximum benefits realisation

Thomas-Kilmann Conflict Resolution Model

The project manager should be capable of utilising a number of strategies in order to resolve conflict. The most appropriate choice of resolution strategy will depend on a number of situational factors including the level of:

- Assertiveness: how important is it for you to satisfy your demands
- Co-cooperativeness: how important is it for the other party to satisfy their demands

Based on these two factors the Thomas-Kilmann conflict resolution model describes five strategies for managing conflict.



- **Collaborate:**
 - this strategy entails both parties working together in order to find a mutually beneficial solution. This requires time and effort on both parts to find a point of agreement from which to build and then moving forward, sometimes with the need for creative solutions
- **Compete:**
 - where one party has sufficient power, they might decide to pursue their goals to the exclusion of the other participant. This may be pursuing own rights or enforcing a position that has to be maintained (e.g. legislation or company policy)
- **Accommodate:**
 - an individual may sacrifice their own goals and accept the wishes or direction mandated by the other side. This may be through preferring not to challenge and yielding, being generous or to gain some 'credit' with the other party
- **Compromise:**
 - this approach lies somewhere in between competing and accommodating. Both parties attempt to partially obtain their goals but have to make some sacrifices, thereby falling somewhere short of their ideal solution
- **Avoid:**
 - the individual does not attempt to pursue their concerns or those of the other party. Instead, they may attempt to 'ignore' the conflict, skirt around the issue, postpone dealing with it or even withdraw altogether. This might be a deliberate tactic in certain situations but should be employed with great caution.

The table below illustrates some of the factors that may be relevant when determining which strategy is most suitable.

	Collaborate	Compete	Compromise	Accommodate	Avoid
What	Win-Win	Win-Lose	Draw?	Lose-Win	Lose-Lose?
Why	Need long-term commitment from both parties	Need to comply with standard processes	Need to avoid disruption and move on	Earn 'brownie points' for future use	Intervention may aggravate problem
Who	Project Manager & Team Member reach mutually beneficial solution	More senior party (e.g. PM) decides	<i>Acceptable</i> agreement between Project Manager & Team Member	Other party (e.g. Team Member) decides	Neither party makes decision
When	Important to reach an ideal solution	You have the authority / know you're right	Time-pressure / equal power	It might be important for other party to 'learn' from their decision	Trivial issue
How	Explore differences in order to reach agreement	Quick decision made by authorised party	Split the difference	Delegate decision to other party	Withdraw or deflect decision to a third party
You Say...	My position is..., what's yours?	"If you don't do this I'll..."	I'm prepared to... if you...	You have convinced me...	I'm not in a position to discuss...

When addressing conflict it is important to distinguish between the personalities involved, the culture of the organisation and the positions being taken. This can reduce tensions and facilitate an objective approach. Assumptions and emotions are often difficult to elicit.

Sometimes it may be appropriate to appoint a mediator, particularly where employment issues are at stake and expert knowledge is required.

Typical actions for resolving interpersonal conflict may comprise:

- ensuring an appropriate venue is chosen – space, refreshments, accessibility
- proposing timings, conduct guidance and objectives for each session
- identifying facts, evidence and assumptions
- recognising the various levels of stakeholder power and influence
- assessing the potential impact of personal views
- agreeing the issues to be resolved, prioritising as required
- reflecting perspectives, expectations, antagonisms and areas of commonality
- defining escalation routes if resolution is not possible

It must be remembered that managing conflict requires sensitivity and empathy, supported by an objective and ethical stance. Conflict can be reduced from the outset through effective planning and communication. Clear governance policies also enable communication of dissent and improvements in a formal, constructive manner.

Negotiation (APM BoK 2.1.6)

“Negotiation is a discussion between two or more parties aimed at reaching agreement.”

APM BoK 6th Ed.

Negotiation takes place regularly throughout the project and can be formal or informal in nature. Formal negotiation is typically with suppliers and centres on a contract, while informal negotiation is often used when resolving conflict or to obtain internal resources.

Negotiation is the process of attempting to reach agreements in situations where participants have both common and separate interests. It aims to be a path from conflict to co-operation. Negotiation may involve modifying original positions and should meet the legitimate interests of both parties to the greatest extent possible (win-win), resolve conflicting interests fairly, and be durable.

Win-Lose situations are short term and where one party feels unfairly treated can often lead to an adversarial (lose-lose) scenario.

The project manager will negotiate with various stakeholders throughout the project. The areas where negotiation may be required include time, cost, quality, resources, priorities, procedures and contracts among others.

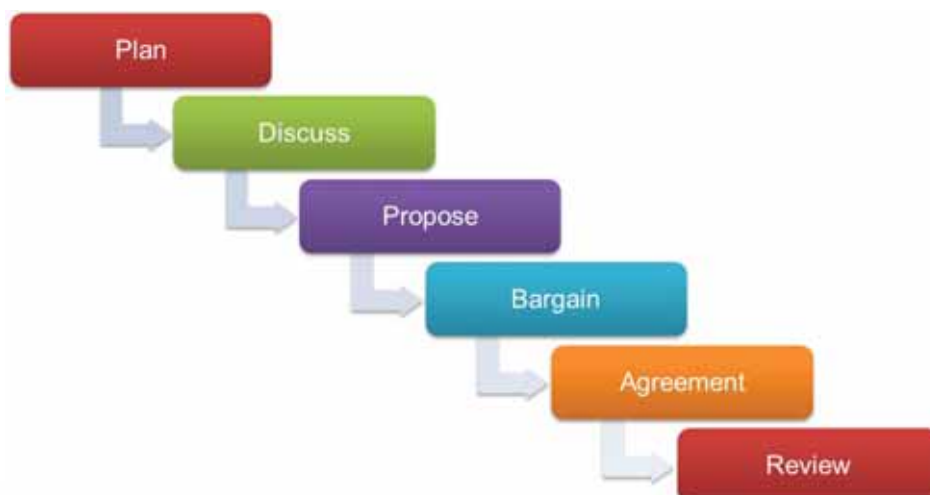
Negotiation falls in two categories:

Competitive negotiation implies getting the best deal regardless of the needs and interests of the other party. This approach can easily result in a “winner takes all” battle. While best practice indicates that this should be avoided, it is not always possible to do so.

Collaborative negotiation seeks to gain a “win-win” situation, where the parties involved in the negotiation get part or all of their wishes. This approach tends to produce long-term relationships, minimises potential for conflict and tends to produce the best results.

Negotiation Process

A negotiation process typically comprises a number of distinct phases:



Process	Actions
Planning	<ul style="list-style-type: none"> ▪ Consult with others to fully establish inputs, constraints, relationships and expectations – gather as much relevant information as possible ▪ Identify interests and issues on both sides – this includes social and cultural differences ▪ Develop proposals – what does the organisation want? ▪ Know your BATNA (Best Alternative to Negotiated Agreement) – fall back plan (if any) ▪ Think about the balance of power between both parties ▪ Develop your negotiating strategy ▪ Organise your team ▪ Think about the structure of the meeting: <ul style="list-style-type: none"> ◦ Agenda ◦ Location ◦ Logistics
Discussing	<ul style="list-style-type: none"> ▪ Set the scene... ▪ Introduce parties and their roles and establish rapport ▪ Invite the other party to state their objectives ▪ State your objectives ▪ Clarify agenda for rest of meeting ▪ Actions include: <ul style="list-style-type: none"> ◦ Listening ◦ Probing and questioning ◦ Paraphrase regularly ◦ Check understanding
Proposing	<ul style="list-style-type: none"> ▪ Present proposal (consider tactical approach) ▪ Evaluate responses ▪ Prioritise issues ▪ Communicate clearly and openly ▪ Listen and read non-verbal communication

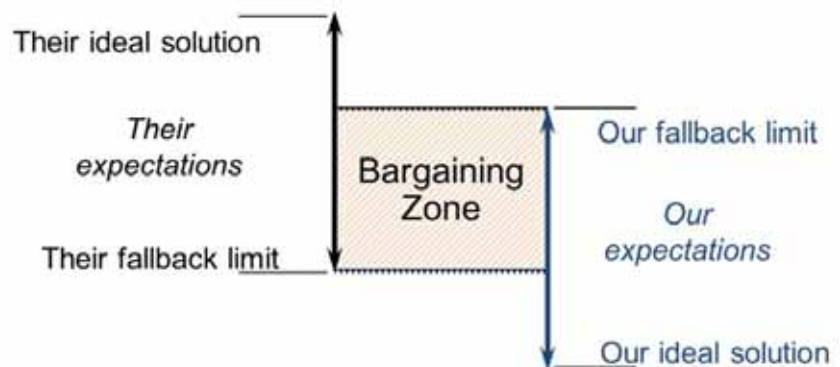
Process	Actions
Bargaining	<ul style="list-style-type: none"> ▪ Be prepared for trade-offs ▪ Protect the non-negotiables ▪ Value concessions from the other party's perspective
Agreement	<ul style="list-style-type: none"> ▪ Summarise agreements ▪ Schedule further actions if required and agree next steps ▪ Record in writing
Review	<ul style="list-style-type: none"> ▪ Communicate outcome to all relevant stakeholders ▪ Implement as agreed ▪ Conduct lessons learned: <ul style="list-style-type: none"> ◦ About the problem? ◦ About the other party? ◦ About our negotiating skills - what went right and what went wrong? ◦ What can we do better next time?

Bargaining Zone / Tolerance

In reality there are a range of acceptable solutions. Each party will have identified their ideal solution and what they realistically expect to achieve. The bargaining zone sits between the fall-back positions of each party. This is the area that needs to be negotiated and an agreement reached.

Ideally project managers should aim for a principled negotiation where both parties agree to share a common problem and strive for a solution that achieves mutual benefits.

Positional bargaining should be avoided (i.e. the successive taking and then giving up a sequence of positions). Positional bargaining can damage relationships and destroy credibility. It is inefficient and often results in compromise as opposed to collaborative agreement.



Negotiating Power

Parties to a negotiation will possess different types of power that can be used to influence the outcome of the negotiation. These powers include:

- **Reward:** Ability to dispense rewards to entice the other party, such as financial incentives
- **Penalty:** Threat of taking something away if one party does not agree to the desires of the other
- **Formal:** One party has authority over the other (e.g. hierarchical position)
- **Expert:** Experience that provides an advantage through increased credibility and knowledge
- **Referent:** Based on the power of a higher authority, e.g. the sponsor.

Negotiating Tactics

Various types of tactic might be used within negotiation situations, not all which may be considered as being ethical or business like. Project managers should also be aware of cultural influences which can significantly impact the negotiation process and the likelihood of developing long-term mutually beneficial relationships.

Tactic	Response
Deadlines	Ensure appropriate contingency is built into the plan
Good guy / bad guy	Probe discrepancies between each party and encourage them to come to consensus opinion before re-entering the negotiation Do not allow the 'good-guy' to influence your decision
Limited authority	Ask to deal with the higher authority or test the limits of the initial negotiator
Auction	Where a customer indicates they have a better offer elsewhere, probe for discrepancies and facts Demonstrate that you better understand their needs than the other party
Silence	Restate offer and ask for clarification
Salami technique (sometimes known as Nibbles)	Ensure all requirements are clear and understood before any individual agreement is reached. Strive for collective agreement on all items together

Common Pitfalls in Negotiation

Early in the project the project manager will need to negotiate around requirements, when initial plans are being produced, balancing time, cost and quality and agreeing the project scope in terms of product and work. This will require intense negotiation with stakeholders.

The project manager will need to negotiate with line managers for the release of resources required by the project and undertake formal negotiations with suppliers and contractors.

During project delivery, conflict will arise and negotiation skills will be required to resolve these.

Project managers will need to apply negotiating skills throughout the project life cycle. Some common pitfalls associated with negating include:

- being ill-prepared
- opening negotiations with an unreasonable offer
- not taking “time-outs” when negotiations are unduly protracted
- rushing negotiation in order to secure a quick agreement
- failing to walk away if an agreement is not possible (without breaching tolerances)
- panicking.

It is important that the project manager be aware of these pitfalls and look for the warning signs that these pitfalls are either present or may present themselves.

Desired Negotiating Skills

As negotiating skills are required across the project, desired skills required for effective project management include:

- an ability to set goals and limits
- emotional control
- excellent listening skills
- excellent verbal communication skills
- knowledge of when and how to close the negotiation.

6. Leadership and Teamwork

Coverage of Learning Outcomes:

- Impact of leadership
- Situational leadership approach
- Creation and management of teams.



Leadership (APM BoK 2.1.5)

“Leadership is the ability to establish vision and direction, to influence and align towards a common purpose, and to empower and inspire people to achieve success.”

APM BoK 6th Ed.

There are many definitions of leadership; some examples are:

- Leadership may be considered as the process (act) of influencing the activities of an organised group in its efforts toward goal setting and goal achievement. (Stogdill, 1950)
- Leadership is interpersonal influence, exercised in a situation, and directed, through the communication process, toward the attainment of a specified goal or goals. (Tannenbaum, Weschler & Massarik, 1961)
- Leadership is a process of influence between a leader and those who are followers. (Hollander, 1978)
- Leadership is an influence process that enables managers to get their people to do willingly what must be done, do well what ought to be done. (Cribbin, 1981)
- Leadership is the process of influencing the activities of an individual or a group in efforts toward goal achievement in a given situation. (Hersey & Blanchard, 1988)
- Leadership is the art of influencing others to their maximum performance to accomplish any task, objective or project. (Cohen, 1990)
- Leadership is a process of giving purpose (meaningful direction) to collective effort, and causing willing effort to be expended to achieve purpose. (Jacobs & Jaques, 1990)
- Leadership is the art of mobilising others to want to struggle for the shared aspirations. (Kouzes & Posner, 1995)

From these, it is evident that a leader requires followers and this is typically achieved by communicating a vision that encourages people to follow this goal. Leadership involves argument, inducement and influencing – all skills that might not be inherent but can be developed. Effective leadership enables the project to proceed in an environment of change and uncertainty.

Management v. Leadership

Leadership is not the sole responsibility of the project manager and the role of leader may be rotated around the project team depending on the technical skills, experience and communication ability of both the team and the project manager.

Henry Fayol's five functions of management are important attributes for any project manager:

- Plan
- Organise
- Command
- Control
- Co-ordinate



These 'hard' skills may not be enough to guide and influence the multiple project stakeholders and 'softer' management skills may also be required, especially where

the project manager does not have formal authority (for example, when the team is part of a matrix structure and/or if the project manager needs to influence senior stakeholders).

Leadership Characteristics

Effective leaders often display common characteristics that help to define their leadership style. These characteristics can also be learned and developed.

- Communicator:
 - having the ability to define and communicate a vision in a manner that meets the needs of each stakeholder
- Charismatic:
 - often closely linked to communication skills, charismatic project managers are able to appeal to stakeholders and present compelling arguments
- Attitude (can-do):
 - positive project managers help create a similar attitude within their team, thereby helping them to achieve challenging goals
- Fairness:
 - respect for differing views and opinions and integrity is important if the project manager is to gain the trust of team members and other stakeholders
- Persuasive:
 - project managers will need to influence stakeholders by presenting compelling arguments (for instance, negotiating project resources with functional managers and/or the project sponsor)

- Inventive:
 - creative solutions will often be required to resolve project issues in a timely manner
- Adaptable:
 - a flexible and pragmatic approach will often be required to ensure that solutions are reached which accommodate the varying interests of project stakeholders
- Common sense:
 - sensible solutions are required to satisfy the triple constraints of the project; the *best* technical solution may not be the optimum approach if the other project constraints are disregarded
- Open-minded:
 - project managers must be open to new ideas and opinions in order that effective strategies are adopted in order to satisfy project objectives
- Vision:
 - project managers must have the ability to define and communicate the project goals in a manner that encourages stakeholders and team members to follow their lead (especially important in the early stages of any project)
- Persistent:
 - there will be times when different approaches may be required to overcome project issues if the initial solution or strategy proves to be unsuccessful

Although it is unlikely that a project manager will possess all of these characteristics, it may be that they are displayed by team members who may also adopt a leadership role at different stages in the project.

Another key leadership role of the project manager is to ensure that team members are motivated to behave in a way that satisfies the needs of the project and team members' individual goals and aspirations. There are a number of models that may help project managers understand the behaviour of individual team members in the area of motivation.

Hierarchy of Needs (Maslow)

Maslow suggested that individuals may find it difficult to satisfy higher level needs unless the lower level needs are appeased first. The levels in Maslow's hierarchy of needs are:

Level of Need	Description
Physiological	The basic needs for food, water, sleep etc.
Safety	May include security (including job security), personal safety, predictability and order
Social	Team members feel comfortable with colleagues and other individuals they are required to interact with
Esteem	Individuals have self-respect and feel their contribution is valued by others
Self-actualisation	Team members continually try to develop their potential

Note that the hierarchy does not apply to everyone equally nor does it apply to any one person *all* of the time.

Hygiene Factors and Motivators (Herzberg)

Herzberg identified two independent categories of need which influence team behaviour in different ways. These are referred to as Motivators and Hygiene Factors.

Motivators motivate people, while hygiene factors do not motivate, but their absence demotivates. Typical examples for each of these are shown in the following table:

Motivators	Hygiene Factors
▪ Respect	▪ Working conditions
▪ Reward	▪ Salary
▪ Recognition	▪ Relationships
▪ Responsibility	▪ Environment
▪ Challenging assignments	▪ Company policies
▪ Achievement	▪ Job security
▪ Personal growth	▪ Personal life

McGregor

Theory X and Theory Y are theories of human motivation created and developed by Douglas McGregor in the 1960s and describe two contrasting models of workforce motivation.

Theory X and Theory Y have to do with the perceptions managers hold on their employees, not the way they generally behave - it is about attitude not attributes.

Theory X - In this theory, management assumes employees are inherently lazy and will avoid work if they can and that they inherently dislike work.

As a result of this, management believes that workers need to be closely supervised and comprehensive systems of controls developed. A hierarchical structure is needed with narrow span of control at each and every level.

According to this theory, employees will show little ambition without an enticing incentive program and will avoid responsibility whenever they can. According to Michael J. Papa, if the organisational goals are to be met, theory X managers rely heavily on threat and coercion to gain their employees' compliance.

Beliefs of this theory lead to mistrust, highly restrictive supervision, and a punitive atmosphere. The Theory X manager tends to believe that everything must end in blaming someone. He or she thinks all prospective employees are only out for themselves.

Usually these managers feel the sole purpose of the employee's interest in the job is money. They will blame the person first in most situations, without questioning whether it may be the system, policy, or lack of training that deserves the blame.

A Theory X manager believes that his or her employees do not really want to work, that they would rather avoid responsibility and that it is the manager's job to structure the work and energise the employee.

Theory Y - In this theory, management assumes employees may be ambitious and self-motivated and exercise self-control. It is believed that employees enjoy their mental and physical work duties. According to them work is as natural as play. They possess the ability for creative problem solving, but their talents are underused in most organisations.

Given the proper conditions, theory Y managers believe that employees will learn to seek out and accept responsibility and to exercise self-control and self-direction in accomplishing objectives to which they are committed. A Theory Y manager believes that, given the right conditions, most people will want to do well at work. They believe that the satisfaction of doing a good job is a strong motivation. Many people interpret Theory Y as a positive set of beliefs about workers.

Theory Y managers are more likely than Theory X managers to develop the climate of trust with employees that is required for employee development which is a crucial aspect of any organisation. This would include managers communicating openly with

subordinates, minimising the difference between superior-subordinate relationships, creating a comfortable environment in which subordinates can develop and use their abilities. This climate would be sharing of decision making so that subordinates have say in decisions that influence them.

Theory X and Theory Y combined - For McGregor, Theory X and Y are not different ends of the same continuum. Rather they are two different continua in themselves.

In summary, Theory X assumptions are that individuals dislike their careers and Theory X people have to be supervised. As for Theory Y, assumptions are that individuals like their careers and are willing to take on responsibility. Theory Y people don't need supervision and can be expected to provide productive value in their jobs.

Leadership Styles

Leadership theories have evolved over time from “Great Man Theory” in the 1800s to Situational Leadership, Transactional Leadership and Transformational Leadership to, in more recent times, Authentic Leadership. It is worth understanding some of these theories.

Transactional Leadership – this theory was put forward by Max Weber in 1947 and subsequently expanded on by Bernard Bass in 1981. This style is most often used by managers and focuses on the basic management processes of controlling, organising, and short-term planning. Famous examples of leaders who have used transactional technique include General McCarthy and President de Gaulle.

Transactional leadership involves motivating and directing followers primarily through appealing to their own self-interest. The power of transactional leaders comes from their formal authority and responsibility in the organisation. The main goal of the follower is to obey the instructions of the leader. The style can also be mentioned as a ‘telling style’.

The leader believes in motivating through a system of rewards and punishment. If a subordinate does what is desired, a reward will follow, and if he does not do what is asked, punishment follows. Here, the exchange between leader and follower takes place to achieve routine performance goals

Transformational Leadership – Bernard Bass and James McGregor Burns are credited with developing this theory. Transformational leadership is a leadership style that inspires positive changes in those who follow. Transformational leaders are generally energetic, enthusiastic, and passionate. Not only are these leaders concerned and involved in the process; they are also focused on helping every member of the group succeed as well.

The differences between Transactional and Transformational Leaders

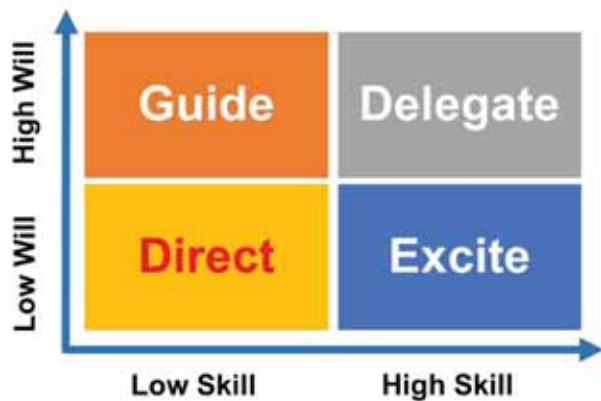
Transactional leadership	Transformational Leadership
<ul style="list-style-type: none"> ▪ Leadership is responsive 	<ul style="list-style-type: none"> ▪ Leadership is proactive
<ul style="list-style-type: none"> ▪ Works within the organisational culture 	<ul style="list-style-type: none"> ▪ Work to change the organisational culture by implementing new ideas
<ul style="list-style-type: none"> ▪ Transactional leaders make employees achieve organisational objectives through rewards and punishment 	<ul style="list-style-type: none"> ▪ Transformational leaders motivate and empower employees to achieve company's objectives by appealing to higher ideals and moral values
<ul style="list-style-type: none"> ▪ Motivates followers by appealing to their own self-interest 	<ul style="list-style-type: none"> ▪ Motivates followers by encouraging them to transcend their own interests for those of the group or unit
<ul style="list-style-type: none"> ▪ Management by exception: maintain status quo, stress correct actions to improve performance 	<ul style="list-style-type: none"> ▪ Individualised consideration: each behaviour is directed to each individual to express consideration and support ▪ Intellectual stimulation: promote creative and innovative ideas to solve problems

Will / Skill – Successful Leadership

Dwight D. Eisenhower once said: *“leadership is the art of getting someone else to do something you want done because they want to do it.”*

Leading a team and thus the project successfully requires the project manager to focus on the team and decide for each team member, the best management style for them to be successful.

Author Max Landsberg offers an approach that helps match a style of interaction with the team member's readiness for the task. He further offers the following simple tool to assist in this:



The diagram illustrates the approach by contrasting a level of motivation against skill.

Skill level refers to the experience, training and understanding of the task allocated to the team member.


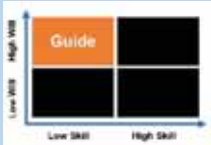
Will level refers to the desire of to achieve, possibly based on incentives being offered and the level of security or confidence of the team member.


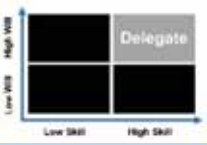
The following basic steps can be used in applying the matrix:

1. Identify the skill and will of the team member to accomplish the task
2. Use the matrix to identify an appropriate style to lead the team member
3. Discuss your approach and reasons for the approach with the team member

The third point above is important as it helps clarify your perception of the skill / will of the team member and allow you to modify your interaction style. It also demonstrates to the team member that you are willing to listen and adapt your style to their effectiveness.

Guidelines on which approach and when to use the approach are indicated in the following table:

 DIRECT – Low Skill / Low Will	
Use when the team member: <ul style="list-style-type: none"> • Is new to the task, project or role • Has low confidence • Has tried before and failed 	How to use: <ul style="list-style-type: none"> • Build the will – provide clear briefing and specific instructions. Develop a vision of future performance. Identify what motivates them. • Build the skill – structure tasks for ‘quick wins’ – provide mentoring and training • Sustain the will – provide frequent feedback – acknowledge good work, nurture team member through praise
 GUIDE – High Will / Low Skill	
Use when the team member: <p>Is an enthusiastic beginner, new to a particular task, project or role.</p>	How to use: <p>Use a combination of directing (telling) and guiding / coaching (inquire / ask / use open ended questioning) to build their skill.</p> <ul style="list-style-type: none"> • Invest time – answer questions and explain • Create a risk free environment to allow for early mistakes and learning • Relax control as progress and development is shown

 EXCITE – High Skill / Low Will	
Use when the team member: <ul style="list-style-type: none"> • Is a skilled, experienced person who has hit a plateau • Needs a new challenge • Is being affected by some other factor 	How to use: <ul style="list-style-type: none"> • Identify the reason for low willingness and low motivation – consider the assigned task, management style or personal factors • Monitor and provide (regular) feedback
 DELEGATE – High Will / High Skill	
Use when the team member: <p>Is a skilled worker looking for more opportunities to grow and develop</p>	How to use: <ul style="list-style-type: none"> • Provide freedom to complete the work – set the objective, not the method. • Praise (do not ignore) • Encourage the team member to take responsibility – involve them in decision-making. Offer your opinions sparingly, and only if there is a very good reason for doing so. • Take appropriate risks – give more demanding (stretching) tasks and do not overmanage the team member.

In his book *(Tao of Coaching – Boost your effectiveness at work by inspiring and developing those around you (Profile Books, 2003, ISBN 978 – 1861976505)*, Max Landsberg remarks that good management should also “adapt to growth.” For people with whom one is in a long term working relationship, the project manager wants them to increase their skill and will (motivation). If this is successful, the project manager needs to gradually adapt their style en route to “delegate.”

That is, the project manager needs to move from “direct” to “guide” or “excite” and ultimately to “delegate.”

Teamwork (APM BoK 2.1.7)

“Teamwork is a group of people working in collaboration or by co-operation towards a common goal.”

APM BoK 6th Ed.

The following definition of a team helps to highlight the key aspects of working within teams.

“A team is a small group of people with complementary skills committed to a common purpose, with shared performance goals and a common approach, holding themselves mutually accountable”

Katzenbach and Smith

Projects normally require a group of people who interact and collectively contribute to the creation of deliverables and achievement of the project objectives. The focus of teams and teamwork is on mutual accountability and performance. An understanding of what makes an effective team and the dynamics involved is essential for an effective project manager.

Differences between Groups and Teams

Groups and teams share many similarities but their function and purpose can differ quite significantly. It is essential for the project manager to understand the differences between groups and teams and their relative dynamics if they are going to be able to manage them effectively. Some of the key differences between groups and teams are outlined below.

Characteristic	Team	Group
Skill-set and interests	Team members are selected on the basis of their individual and typically complimentary skills. Often teams are cross-functional in nature which makes the careful selection of team members crucial to its overall effectiveness.	Groups have a commonality amongst the membership that is not found in teams. Commonality of interest might lead to less conflict than that normally witnessed within a team although this may be untrue if the group needs to reach a consensus decision.

Characteristic	Team	Group
Ease of creation	Team members each bring their own set of skills, ideas and aspirations to the team. It is far likely that the development of the team will be a more dynamic process than the setting up of a group.	Due to the similarities that exist between group members they are typically easier and quicker to form than teams. A higher level of stability is also likely within groups with this stability again being easier to achieve.
Level of interaction	The team's strength lies in its ability to interact effectively. Each specific role is likely to have an impact on another team member. A higher level of social interaction is also likely in teams.	Group members may operate in a relatively isolated fashion, taking guidance from the group's leader as and when required.
Accountability	The output of a team is likely to be highly dependent on the collective efforts of the members. Members are likely to play a greater role in the adopted approach and decisions of the team. A team member who is absent is likely to have far greater impact than an absent group member.	Shared accountability is not a prerequisite for the majority of groups where accountability and ownership of actions is often left to the individual. For the majority of group members, their individual actions are unlikely to have significant impact on the rest of the group.
Size	Teams are likely to be smaller in size than groups (some research limits the maximum ideal number to between seven and twelve members). Individual buy-in is crucial in teams and this will be more difficult to achieve if the size is too great.	Groups can grow very large indeed (examples might be the support of a football club or a charitable foundation). When there is no great need for collective decision making and working processes are largely defined, buy-in from individual members is not normally necessary.

Characteristics of Effective Teams

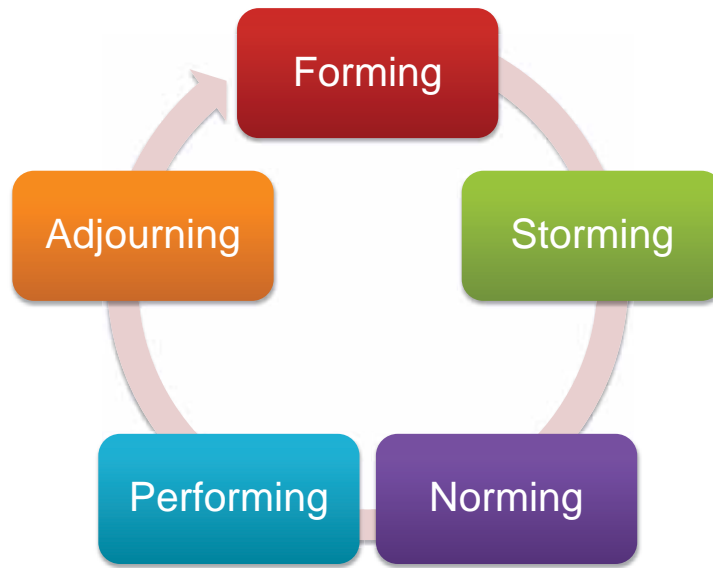
High-performing teams share many similar attributes. The project manager should ensure that appropriate effort is applied to fostering these characteristics, thereby increasing the likelihood of a successful project.

- **Shared aims:** Members believe in the collective goals of the project
- **Trust:** There is a climate of trust and members are encouraged to openly discuss ideas and issues without fear of retribution
- **Communication:** Communication channels are defined allowing information to be shared freely amongst team members
- **Shared skills:** Complimentary skills (and roles) exist within the team, allowing members to interact and decisions to be made quickly and in an informed manner
- **Good relationship with other teams:** The team acknowledges the need to work with other parts of the organisation and fosters a mutually beneficial working relationship
- **Effective leadership:** Team members are encouraged to assume leadership of the team when necessary to do so and the project manager is also seen as a credible and effective leader
- **Self-regulating:** The team is self-managing, self-organising and self-regulating and holds themselves mutually accountable for their actions

Team Dynamics

The project manager should be familiar with the process of forming a group of people into a project team that is to work together for the benefit of the project. This can be achieved in a formal manner by using start-up meetings, seminars, workshops etc. and in an informal manner by ensuring the team works well together. Motivating and resolving conflicts between individual members of the team are important elements of teamwork.

Tuckman's 'Stages of Development of a Team' is the most popular model used when looking at team development. The five stages of team development are depicted in the graphic below and detailed in the table that follows.



Stage	Description
Forming	At this stage the set of individuals has not yet become a group. Individuals explore each other’s attitudes and background. Members are also keen to establish their individual identities and make a personal impression on others.
Storming	This is a conflict stage in the group's life and it can easily become uncomfortable. Members bargain with one another as they attempt to sort out what each of them wants individually, compared to what the collective group wants. It is likely that interpersonal hostility may be generated as differences in individual goals are revealed and the early relationships established in the forming stage may be disrupted.
Norming	The group usually develops a way of achieving its objectives together. The questions of who will do what, and how, are addressed. Working rules are established in terms of norms of behaviour and role allocation. A framework is therefore created through which each member can relate to the others.
Performing	The penultimate stage is concerned with actually getting the job done. A fully mature group has been created, which can now get on with its prescribed work. Not all groups develop to this stage with some becoming stalled in an earlier stage.

Stage	Description
Adjourning	<p>Tuckman later revisited his original work and described another stage. Adjourning is arguably more of an add-on to the original four stage model rather than an extension - it views the group from a perspective beyond the purpose of the first four stages.</p> <p>Adjourning involves dissolution. It has to do with the termination of roles, the completion of tasks and reduction of dependency. There may be a sense of loss and anxiety at this break-up. The process can be stressful, particularly where the dissolution is unplanned.</p> <p>When the project has been relatively successful with few problems, conflict and in-fighting, team members may have that feel-good factor about themselves and the project. They may also exhibit a decline in motivation as the project winds down and a feeling of loss and anxiety, particularly about their future.</p>

Social Roles Model – Belbin

Techniques such as team profiling can help form an understanding of the preferred style of team members. It can also help in selecting team members or help consider personal development opportunities (which can often act as a significant motivator). Profiling may also be used as an ice-breaker at team kick-off workshops.

Meredith Belbin developed a tool (in the form of a questionnaire and subsequent analysis) which identifies nine key team roles and their primary characteristics. The roles are focused around three areas - **task, people and ideas**.

Note that people can and often do assume more than one of these. Belbin stated that an understanding of people's preferred role is important and also that an imbalance of preferred roles within a single team may have an adverse impact on the team's effectiveness.

	Team Role	Description	Allowable Weakness	Non-Allowable Weakness
Cerebral	Plant	Creative, unorthodox	Ignores details, preoccupied	Ownership vs. cooperation
	Monitor Evaluator	Sober, strategic, sees options	Lacks drive, overly critical	Cynicism without logic
	Specialist	Single minded, rare knowledge	Overlooks big picture	Ignoring important info
People	Co-ordinator	Mature, confident, clarifies goals	Manipulative, lazy (own work)	Take credit for team effort
	Resource Investigator	Develop contacts, enthusiastic	Overoptimistic, loses interest	Letting clients down
	Team worker	Cooperative, mild, diplomatic	Indecisive, easily influenced	Avoiding pressure situations
Action	Completer Finisher	Painstaking, conscientious	Inclined to worry, over attentive to detail	Obsessive behaviour
	Implementer	Disciplined, reliable, practical	Inflexible, slow to respond	Obstructing change
	Shaper	Challenging, full of drive, dynamic	Provokes others, hurts feelings	No apologies, no humour

Note that 'allowable-weaknesses' are only deemed to be so as they typically form the flip-side of the specific strength exhibited by that particular role.

Teams and the project manager support each other in the delivery of the project objectives by:

- Developing team members professional / personally
- Providing an interesting and stimulating work environment
- Developing excellent communications and interpersonal relationships throughout the project
- Utilising a complementary mix of skills and experience leading to creative ideas
- Greater commitment to project aims and objectives

These traits provide the synergy whereby increased productivity, improved customer satisfaction, lower error rates, reduced scrap, efficient development / delivery, increased market share and potential for innovation are the result.

Team Dynamics Issues

The issues a project manager may need to deal with are many and varied and include:

- Ensuring arguments are constructive (as opposed to destructive)
- Embracing differing cultures, outlooks, priorities, and interests of team members
- Recognising that teams may form and re-form multiple times
- Roles need clarification to avoid conflicts
- The Team Leader needs to be credible
- There will usually be competition over team leadership
- Some team members may lack commitment
- Senior management need to provide active support
- The team will need definition and structure
- There is only a limited amount of available team energy
- Avoidance of 'Groupthink'

Groupthink is a danger for groups and teams that have continued to perform effectively (in their own eyes) for some time. Executive groups, Boards and specialist technical teams are particularly vulnerable as they can also be isolated from mainstream activities.

Groupthink develops when the closeness of the group makes consensus-seeking the dominant force. A successful team or group is a very comfortable place to be. Hence it is easy for groups to move to a state where members, as a result of long adaptation to group norms, strive to not upset the 'togetherness' of the group. In this state proposing alternative ways of doing things can somehow be seen as deviant and threatening behaviour.

This can be dangerous for the survival of the group. Groups that do not change their composition, methods and aims to suit environmental changes, soon find themselves overtaken by events.

7. Planning for Success

Coverage of Learning Outcomes:

- Business case, ownership, authorship
- Benefits management
- Information management
- Project management plan, authorship, approval
- Project management plan contents
- Estimating
- Earned value management
- Earned value calculations and interpret earned value data
- Stakeholder management
- Use of payback, internal rate of return and net present value
- Project reporting cycle.



Business Case (APM BoK 3.1.1)

“The business case provides justification for undertaking a project or programme. It evaluates the benefit, cost and risk of alternative options and provides a rationale for the preferred solution.”

APM BoK 6th Ed.

What is a Business Case?

Commonly argued to be the single most important document in any project, the business case defines ‘why’ a project is being undertaken by providing a justification for its viability. This justification is typically supported by a comparison of the project’s quantified costs and benefits.

An outline business case is a key output of the project’s concept phase and documents the initial idea (problem or opportunity) as well as providing the information required to scope and plan the project in detail. This should contain sufficient relevant and realistic information for an informed decision to invest in the Definition phase to be taken.

At the end of the Definition phase the high-level information contained in the outline business case will be revalidated to ensure that the project is still viable and a detailed business case is prepared.

The sponsor must ensure that the business case remains feasible throughout the project life cycle. At a minimum this will involve formally reviewing the business case at each stage-gate to ensure that it is not impacted by factors internal or external to the project.

The primary use of the business case at the project closeout is to determine whether the project manager and team have managed to deliver the project in compliance with the agreed success criteria (for example, delivery within time and cost targets).

Finally at some point during the project’s operational phase, the sponsor is responsible for undertaking a formal review of whether the defined project benefits have been realised or not.

Business Case Content

The project is owned by the sponsor who has ultimate accountability for ensuring that the benefits are achieved. The project manager will usually be delegated with the responsibility for preparing the business case supported by specialist and subject matter experts.

The content of a business case will vary across organisations. As well as a formal comparison of the project’s costs and benefits, the business case provides a high-level overview of the entire project. The typical contents of a business case would include:

- Strategic case – the background of the project or programme and why it is needed

- Options appraisal – what options have been considered and the preferred option (including do-nothing)
- Expected benefits – the benefits that will arise from the work and any unavoidable dis-benefits
- Commercial aspects – the costs, investment appraisal and funding arrangements
- Risk – the major risks and their impact on the business case
- Timescales – a summary of the delivery of outputs and subsequent realisation of benefits.

Business Case – Ownership, Authorship and Approval

The business case is owned by the project sponsor but it is likely that additional input to its creation and/or maintenance will be provided by other project stakeholders including the project manager, subject matter experts, the project office, finance department etc.

While the preparation of the business case may be undertaken by a delegated nominee, typically the project manager, the sponsor will approve or seek approval for the business case. This is generally achieved with support from other senior managers or a project board.



Benefits Management (APM BoK 3.2.1)

“Benefits management is the identification, definition, planning, tracking and realisation of business benefits.”

APM BoK 6th Ed.

A benefit is defined as: *“the quantifiable and measurable improvement resulting from completion of deliverables that is perceived as positive by a stakeholder.”*

APM BoK 6th Ed.

Delivering benefits is the primary reason for change initiatives in an organisation. Generally, most projects end with the delivery of an output. In some cases the project continues through the extended project life cycle to deliver measurable benefits.

It must be clear from the start whether the project is only delivering outputs or extends into delivering the benefits as well. Where a project is only delivering outputs, it is essential that the project manager interfaces with whoever is responsible for delivering the benefits.

A benefit is thus a measurable, positive impact as a result of a change. It is recognised that there are occasions when an unavoidable negative impact is derived. Provided this negative impact is acceptable in the wider context of the total benefits, this may be deemed to be acceptable. Such negative impacts are referred to as disbenefits.

Benefits will normally have a tangible value (such as money saved, jobs created) or could be intangible (corporate reputation, company morale, capacity for change).

Benefits may be quantifiable (often by financial measures – increased profit, reduction in costs) or may be more qualitative in nature (increased staff morale, build brand awareness). Although less tangible and typically more difficult to measure, qualitative benefits are no less important to the project and often may add significant long-term value to the organisation. Quantitative benefits are often known as ‘hard’ benefits where qualitative measures may be known as ‘soft’ benefits.

Irrespective of whether benefits are hard or soft, we must avoid stating benefits that cannot be measured. If benefits cannot be measured, they cannot be managed and their realisation (or otherwise) will be unclear to the organisation and the project stakeholders.

The perceived benefits to be derived form the basis for justifying the investment in the project or programme through an endorsed business case.

Benefits Management

The objectives of benefits management include some of the following factors:

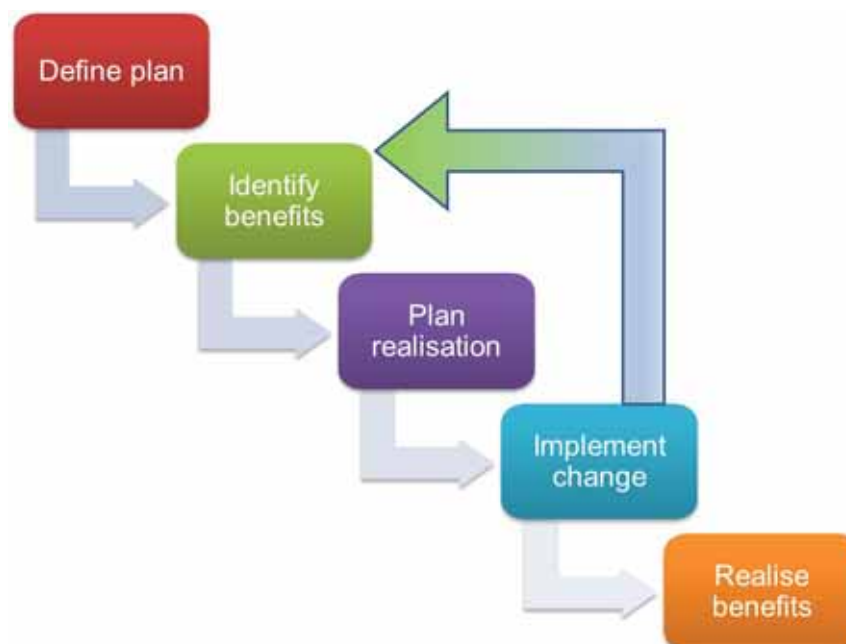
- ensure early agreement of benefits amongst the relevant project stakeholders
- clear link between project benefits and strategic objectives of the organisation
- assigning ownership of benefits and responsibility for their management
- using the benefits to provide a focus for project delivery
- understanding what threats exist to the realisation of benefits and taking steps to mitigate these risks.

Benefits Management Process

Proactive management is required to drive change initiatives and derive the intended benefits from the changed environment. While the change is being implemented, the organisation needs to monitor agreed performance indicators that can reliably predict the eventual realisation of benefits.

Day to day responsibility for the implementation of change and realisation of benefits lies with one or more business change managers and thus the relationship between the project manager and the business change manager is a vitally important relationship. The delivery of outputs from the project and the management of change must be closely co-ordinated.

Benefits management is an iterative process and can be depicted as follows:



The steps in the process can be defined further as portrayed in the following table:

Step	Description
Define benefits management plan	The plan defines how the benefits will be managed by setting out policies for aspects such as measurement, roles and responsibilities, priorities and KPIs
Identify and structure benefits	Benefits realisation is dependent on the delivery of outputs and the achievement of outcomes. The outputs are derived from the requirements stated in the project mandate. The interrelationship between the requirements, outputs and outcomes needs to be understood. This is achieved through benefits modelling and mapping. Each benefit and disbenefit is documented in terms of priority, interdependencies, value, timescales and assigned ownership.
Plan benefits realisation	This step involves identifying, agreeing and capturing baseline measurements with agreed targets. This is necessary in order for the measurement of improvements (benefits). The benefits plan includes the timeline and milestones for realising benefits along with dependencies on project outputs and / or interactions between benefits. This will permit performance reporting and achievement of agreed KPIs to take place.
Implement change	Benefits and disbenefits happen when change happens. This could be “soft” changes such a permanent change in attitude or a “hard” change such as a physical change in the environment. The implementation of change generally results in new opportunities for additional benefits to be identified and / or realised.
Realise benefits	The activities required to realise the benefits and the continued monitoring of benefits realisation must be documented and form part of the handover to business as usual. Embedding the changes within the organisation so that benefits can be realised or continue to be realised is a challenge many organisations face. A business change manager can track the benefits realisation and ensure that the change is permanent, particularly where benefits are realised some time after a project is completed.

Benefits, Success Criteria and KPIs

Achievement of benefits demonstrates the success of the project in the long-term. However, as benefits are typically delivered after the project has closed and the project team – including the project manager – have been redeployed, there needs to be a way of measuring success in the short-term as well. This is done through ‘Success Criteria’.

Success Criteria are defined as:

“The qualitative or quantitative measures by which the success of project, programme and portfolio management is judged.”

APM BoK 6th Ed.

To support the achievement of Success Criteria the project manager can also define and apply Key Performance Indicators (KPIs):

“Measures of success that can be used throughout the project to ensure that it is progressing towards a successful conclusion.”

APM BoK 5th Ed.

It is important to recognise that it is possible for a project to satisfy its defined success criteria but still fail to deliver the anticipated benefits. The opposite situation may also prove to be the case. There should therefore be a direct link between the chosen KPIs, success criteria and benefits in order that stakeholder expectations are understood and satisfied

As indicated before it is, important to recognise that the project manager will be measured at project Handover and Closure on whether the success criteria have been achieved but the benefits will not be realised until some point during the project’s operational phase. This is another reason why ownership of benefits realisation should sit with the project sponsor.

Appropriate choice of project KPIs will help track the likely achievement of the success criteria, thereby allowing corrective action to be taken in a timely manner if required. Two of the most common KPIs in project management are Cost Performance Index (CPI) and Schedule Performance Index (SPI), which are both measures used in Earned Value Management.

Success Criteria are defined by the project sponsor and users, and recorded in the business case. They are assessed at the end of the project as part of the post-project review in the Handover and Closure phase. The project manager is accountable for ensuring the success criteria are met. The project manager defines the KPIs, records them in the project management plan and then tracks progress towards their achievement in the Development phase.

Success factors and maturity (APM BoK 1.1.7)

“Success factors are management practices that, when implemented, will increase the likelihood of success of a project, programme or portfolio. The degree to which these practices are established and embedded within an organisation indicates its level of maturity.”

APM BoK 6th Ed.

Much confusion exists regarding the difference between project success criteria and benefits realisation. This is compounded by the addition of Key Performance Indicators (KPIs) and Success Factors. This module clearly defines each term and explains why a common agreement and alignment of each factor are essential if stakeholder needs are to be understood and satisfied.

Definitions

The APM Body of Knowledge 6th Edition defines each term as follows:

- **Success Criteria:** The qualitative or quantitative measures by which the success of project, programme or portfolio management is judged.
- **Key Performance Indicators (KPIs – APM BoK 5th Ed):** Measures of success that can be used throughout the project to ensure that it is progressing towards a successful conclusion. Each success criterion should have an associated KPI.
- **Success Factors:** Management practices that, when implemented, will increase the likelihood of success of a project. Their presence does not guarantee success but their absence is likely to contribute towards project failure.
- **Benefit:** The quantifiable and measurable improvement resulting from completion of project deliverables that is perceived as positive by a stakeholder. It will normally have a tangible value, expressed in monetary terms that will justify the investment. This is covered in greater detail under topic 3.2.1

Both the project benefits and project success criteria will be quantified in the Business Case to help provide justification for undertaking the project.

KPIs, Success Criteria and Benefits

It is important to recognise that it is possible for a project to satisfy its defined success criteria but still fail to deliver the anticipated benefits. Alternatively, increased, unplanned benefits could result from project activities, yet the project could fail to deliver within its agreed success criteria.

There should therefore be a direct link between the chosen KPIs, success criteria and benefits in order that stakeholder expectations are understood and satisfied. It is also important to recognise that the project manager will be measured at project handover and closeout on whether the success criteria has been achieved but the benefits will not

be realised until some point during the project's operational phase. This is another reason why ownership of benefits realisation should sit with the project sponsor.

Success criteria are often stated in terms of achieving time, cost or quality targets for the project, but should be more wide ranging than that. Key stakeholders will often be able to suggest success criteria.

Appropriate choice of project KPIs will help track the likely achievement of the success criteria, thereby allowing corrective action to be taken in a timely manner if required. Two of the most common KPIs in project management are Cost Performance Index (CPI) and Schedule Performance Index (SPI) from earned value analysis.

Success Factors

Success Factors are elements of the project that should be controlled by the project manager to increase the chance of achieving a successful outcome. These factors are often seen as 'enablers' and may well be behavioural in addition to more tangible influencers. Pinto and Slevin (1988) identified the following success factors from a survey of several hundred projects:

	Success Factors	Description
1	Project mission	Clearly defined project goal(s) and direction (the goals should align with the agreed strategy)
2	Top management support	Sponsor and/or senior management provide guidance and support necessary to achieve success criteria (for example, granting of authority, access to resources etc.)
3	Project schedule and plan	Detailed and realistic plan and specification for the project
4	Client consultation	Early agreement on specification and plan (plus timely response to questions and requests for support and guidance)
5	Personnel recruitment, training, and selection	Having the skills and competence required to undertake the project tasks
6	Technical tasks	Having access to the necessary technology and other expertise

	Success Factors	Description
7	Client acceptance	Willing adoption of the project deliverables by the end users
8	Monitoring and feedback	Timely and accurate data that facilitates informed and effective decision-making
9	Communication	Appropriate identification of stakeholders and effective communication within this group
10	Trouble-shooting	Flexibility and ability to handle unexpected issues

When the success factors are considered together, they form a framework that helps describe an organisational element in which success is the norm and provides a mechanism to help organisations improve and thus mature in their project delivery capability.

Projects are the building blocks of programmes and portfolios. Many organisations develop their maturity by addressing success factors in the project environment. This in turn will lead to maturity modelling.

Maturity Model

A maturity model is defined as: *“an organisational model that describes a number of evolutionary stages through which an organisation improves its management processes.”*

APM BoK 6th Ed

A maturity model defines the stages through which organisations develop their capability from initial fledgling naïve attempts to the point where success is achieved as the norm and the organisation continuously improves. Thus the term "maturity" relates to the degree of formality and optimization of processes, from ad hoc practices, to formally defined steps, to managed result metrics, to active optimization of the processes

Most models are based on the Capability Maturity Model (CMM) developed at Carnegie Mellon University. This model identifies five levels of progression:

Maturity Level	Description
Level 1 – Initial	The delivery process is ad-hoc and occasionally chaotic. Few processes are defined and success depends upon individual effort and heroics.

Maturity Level	Description
Level 2 – Repeatable	Basic processes are established and the necessary discipline is in place to repeat earlier successes
Level 3 – Defined	Processes are documented and standardised. All projects, programmes and portfolios use an approved, tailored version of the documented processes.
Level 4 – Managed	Metrics are gathered on process performance and used to control future performance
Level 5 - Optimising	Continuous process improvement is enabled by quantitative feedback from the process and from piloting innovative ideas and technologies.

It must be noted that an organisation can be at different levels of maturity for each of project, programme or portfolio.

Within each of these maturity levels are key process areas that characterise the level, and for each such area there are five factors:

- Goals
- Commitment
- Ability
- Measurement
- Verification.

In a project environment each of the maturity levels defined in the table above can be further divided into the following key process areas:

- Scope
- Schedule
- Finance
- Risk
- Quality
- Resource

Thus for each of the process areas identified above, the five factors named should be defined and agreed for each process area. This will further help organisations assess and develop maturity in particular areas such as risk management or resource management.

As an example, a common project success factor is a mature approach to project risk management. It is accepted that project risks should be identified, assessed and

responded to appropriately. The relevant attributes that indicate the level of maturity within the organisation to project risk management could be:

Maturity Level	Description
Level 1 – Initial	Risks are arbitrarily classified and rarely, if ever, quantified
Level 2 – Repeatable	Some projects recognise different categories of risk
Level 3 – Defined	Risks are identified, assessed and controlled in accordance with recognised procedures, across all projects
Level 4 – Managed	Projects are able to demonstrate resource and budgetary implications of risks throughout the project life cycle
Level 5 - Optimising	Risk assessment underpins all decision-making

Investment Appraisal (APM BoK 3.4.3)

“Investment appraisal is a collection of techniques used to identify the attractiveness of an investment.”

APM BoK 6th Ed

The purpose of investment appraisal is to assess the viability of project decisions and the value they generate. In the context of a project business case, the primary objective is to place a value on benefits to justify the costs incurred. An investment appraisal is carried out because:

- capital (cash) is a scarce resource
- the rate of return in organisations must normally be higher than that which can be obtained elsewhere
- it helps to assess the viability of several projects and choose between them if necessary
- it links projects to the business, both strategic goals and operational needs.

Many factors can form part of appraisal and include, but are not limited to:

Factor	Description
Financial	Most commonly assess factor – covered in the following text
Legal	The value of an investment may be in it enabling an organisation to meet current or future legislation
Environmental	The impact on the environment is an increasingly important factor when considering an investment
Social	The impact on the social fabric of life is an increasingly important factor and for charitable organisations this could be measured in terms of ‘quality of life’ or even ‘lives saved’
Operational	Benefits may be expressed in slightly more difficult to measure terms of ‘increased customer satisfaction’; ‘higher staff morale’ or ‘competitive advantage’
Risk	All organisations are subject to operational and business risk. An investment decision may be justified because it reduces risk. Alternatively, reputational risk for all organisations features among their ‘top ten’ risks and on the basis of the risk profile a decision may be made to cancel the project.

Organisations typically use a variety of methods to evaluate the financial viability of a project. In order to arrive at a balanced decision, the organisation may use one or more of the following techniques.

Payback Period

This is the simplest of all the methods. All it requires is the calculation of how long it takes to recover the initial project investment out of the subsequent net cash flows, i.e. how long it takes for a project to recoup the initial capital outlay.

It expresses the attractiveness of an investment as a period of time.

Generally, projects with the shortest payback period are seen to be the more attractive investment propositions.

Because the investment is expressed as a time period only, investments of differing size can be easily compared.

Net Present Value (NPV)

A major drawback of the payback period method is that it assumes that the value, or 'spending power' of money remains constant over time: that £10 this year has the same spending power as £10 in, say, seven years' time. We know, however, that due to fluctuations in such parameters as the inflation rate, the 'spending power' of money does indeed vary (and usually reduces) over time. This can be factored in by applying 'Discounted Cash Flow' (DCF) first, and then calculating the 'Net Present Value.

Discounted cash flow makes allowances for this time variation through the use of a 'Discount Rate' that reflects the annual reduction in 'spending power' of money. This allows future cash flows to be 'discounted' and hence compare and assess the viability of alternative projects with widely differing cost and revenue profiles.

With this technique, all the DCF values for each year are totalled so the value of the investment is expressed as a single figure, the 'Net Present Value'. The figure is a 'net' since it is the sum of revenues (positive) less the costs (negative) through the whole lifetime of the investment. The figure is 'Present' because all future costs and revenues are corrected to a 'Present Value' by the use of the 'Discount Rate'.

A Discount Rate is assumed for each investment that is constant through its lifetime. The amount each future cost or revenue of the project is reduced is determined by the selected Discount Rate and also how many years into the future the cost or revenue occurs.

Internal Rate of Return (IRR)

This technique expresses the attractiveness of an investment as a percentage rate.

IRR determines the Discount Rate at which the NPV is zero. In other words, it is the Discount Rate at which the present value of all future cash flow is equal to the initial investment. It relies on there being both cost and income in the investment appraisal.

Companies set IRR at a value above the current market rate and insist that all projects have an IRR greater than the rate they have set. This rate is often referred to as the Hurdle Rate

The IRR is compared with the company's cost of capital in order to establish the economic acceptability of the project. If the IRR exceeds the cost of capital then it is viable. Generally, the bigger the rate and hence the difference, the more attractive the investment appears.

Whereas the NPV technique assumes a static Discount Rate and then calculates the NPV of the investment, the IRR technique assumes an NPV of zero and then calculates the relevant Discount Rate that will achieve it.

In other words the Internal Rate of Return is that Discount Rate, which if applied to the project, would give an NPV of zero.

Investments with higher IRR are generally favoured over those with lower values.

A summary of the techniques and their strengths and weaknesses are shown below:

Technique	Description	Strengths	Weaknesses
Payback	<p>Measures how long does it take to recoup the initial investment for a project.</p> <p>Shortest time period is chosen.</p>	<p>Simple to calculate.</p> <p>Easy to understand.</p> <p>Limits risk to the organisation (a threshold for a maximum payback period may also be mandated).</p>	<p>Cash flows after payback period are ignored</p> <p>Does not normally take into account the time value of money</p> <p>Short-term as it ignores returns after the payback period.</p> <p>Ignores the time-value of money.</p>
NPV	<p>Adjusts forecast returns to a figure representative of today's money using a Discount Rate.</p>	<p>Takes into account the time value of money.</p> <p>It expresses all future cash flows in today's values, which enables direct comparison of options.</p> <p>Allows for inflation and escalation.</p> <p>Looks at whole project.</p> <p>Can be used for comparing options in projects or comparing different projects.</p> <p>Yields a single figure for profitability.</p>	<p>Very sensitive to the discount rate chosen for the project.</p> <p>Assumes a constant rate of interest.</p> <p>More complex to calculate.</p>
IRR	<p>The value of the Discount Rate when NPV = zero.</p> <p>Relies on there being both cost and income in the investment appraisal.</p>	<p>Takes into account the time value of money.</p> <p>Looks at the sensitivity of an investment and the impact of fluctuations in economic factors.</p> <p>Protects the organisation from changing market rates.</p> <p>Can directly compare with the cost of capital.</p>	<p>Complex, difficult to do without a spreadsheet.</p> <p>IRR can yield negative or multiple solutions, for non-standard cash flows.</p> <p>Heavily dependent on assumptions.</p> <p>Can't be used for comparing projects due to differences in cash flows and timings.</p>

Information Management (APM BoK 3.1.3)

“Information management is the collection, storage, dissemination, archiving and destruction of information. It enables teams and stakeholders to use their time, resource and expertise effectively to make decisions and to fulfil their roles.”

APM BoK 6th Ed.

Information and knowledge may be thought of as being the ‘glue’ that binds together the project as well as the people who are involved in the project’s conception, execution and delivery. Projects generate large amounts of information and a structured approach to this information’s creation, dissemination, storage and destruction is essential for the effective management of the project. The larger the project, the greater is the need for an effective information management system.

Information Quality

Poor quality information will lead to ineffective decision making on projects. Research identifies the following characteristics when evaluating the quality of information provided to users.

Characteristic	Description
Accuracy	Data needs to sufficiently accurate for its intended use. The reliability of information provided will help to establish the credibility of the project team. Note that it might be appropriate for information to be approximated, especially in the early stages of the project and/or when making high-level decisions (for example, early estimates of project timescales and costs).
Relevance	Information must be applicable to the users’ needs. The expected response to a communication will help to determine what level of information is required. Redundant information may cause the key message to be misunderstood.
Timeliness	Information must be up to date and available as and when required. This is essential if key project stakeholders are to make effective decisions in a timely manner. The project manager must consider how different versions of information are handled.

Characteristic	Description
Completeness	Information can be misrepresented if only partial data is provided. The level of detail required to make a decision must also be considered. Care must still be taken to ensure that the data is presented in a concise and understandable format.

Information Management

Information management is defined by the APM as “the collection, storage, dissemination, archiving and appropriate destruction of project information”. It is possible that the project’s information management system might be structured around these five components.



- **Collection:**
 - the information management system should define how data is collected in order that quality information may be derived from this data. the information management policy should also define roles and responsibilities relating to acquisition of project information, including the required timescales for its collection
 - suitable use of paper-based and electronic media should be considered, as should the use of relevant project documentation templates

- **Storage:**
 - a decision needs to be taken as to what information is stored, how it is stored and where. Ease of access and retrieval are likely to be prime considerations as will security and confidentiality; for example, password protection of certain pieces of information
 - data storage capacity may also be a key factor in determining what level of information should be stored within each project repository (for example a project folder, intranet etc.)
- **Dissemination:**
 - information needs to be distributed to the right people at the right time. Electronic media can help to expedite this process whilst also providing evidence of the information's distribution and retrieval
 - organisational policies, stakeholder analysis and the project communication plan are primary inputs to this process
- **Archiving:**
 - information is likely to be archived throughout the project life cycle. Factors to consider will be similar to those discussed when deciding how to store information
 - ease of use and access will play an important part in determining the usefulness of the archiving system (for example, implementation of a searchable database may be required)
- **Destruction:**
 - organisational policies regarding the retention and destruction of project information will be heavily influenced by legislation and statutory obligations. Retention schedules should be clearly defined
 - redundant information may severely impact the ease to which information can be found in archival systems. It is typical for a large amount of project information to be purged at project handover and closeout, allowing a more concise and effective archival system
 - it may also be important to consider whether business-as-usual activities might require future access to project information.

Distributing Information

Dissemination of information primarily involves the sending of various types of project report to the appropriate stakeholders. Information distributing methods can broadly be classified as follows.

Interactive	Push	Pull
Multi-directional exchange of information	Sent to specific stakeholders who need to know information	Used for large amount of information
Quickly establishes common understanding	Has information been received and/or understood?	Users access information at their own convenience
Meetings, conference calls etc.	Emails, voicemails, letters etc.	Intranet, e-learning, project database etc.

The method of distribution chosen should take into account the dissemination effort required in addition to the needs of the respective users of each piece of information.

Project Reports

“Reporting is the process by which stakeholders are kept informed about the project”. It is important that information is presented in a consistent and concise manner and standard reporting templates should greatly reduce the administrative burden of project managers and team members. The ownership and audience for each report should be defined in the project communication plan.

Examples of different project reports are listed below.

Report Type	Examples
Progress	Gantt charts, slip charts, status reports (Checkpoint / Highlight), RAG Report (Red, Amber, Green Report)
Quality	Quality register, checklists
Risk	Risk register, checklists
Finance	Budgetary reports, cost variance spreadsheet, earned value forecasts
Review / audit	Checklists, recommendations, process improvement, stage-gate report, project evaluation report

Administrative overload can be further reduced by adopting the principle of ‘Reporting-by-Exception’. Tolerances will be quantified (tolerances will typically include cost and

time) and project managers will escalate only when these tolerances are threatened to be exceeded. Note that it is important for the project manager to escalate when progress is much better than anticipated as well as those situations when agreed targets are not being achieved.

Reporting Cycle

Information needs (content and audience) will change throughout the project life cycle and again, this should be reflected in the project communication plan.

Reports will normally fall into two broad categories:

- **Variance Analysis:** Backward-look at what caused any difference between the agreed baseline targets and the present actual performance. Variances may be favourable or unfavourable.
- **Forecasting:** Prediction of future performance based on actual performance to date. Typical examples of this within the project environment would include the use of earned value (SPI and CPI) to predict a new forecast end date and an estimate of the cost at project completion.

Reporting is normally a formal process where information is generated according to:

- **Time-based methods:** For example, daily, weekly, monthly reports. These reports may include Checkpoint Reports, Status Reports, RAG Reports, etc.
- **Event-based methods:** Created at an agreed point in the project life cycle; examples would include deliverable sign-off, stage-gate reports, end-project reports etc.
- **Ad-hoc:** These reports may be created as and when required or upon request. Ad-hoc reports might include an unscheduled project audit, Exception Reports etc.

In order for the project manager to really understand what is going on in the project he or she needs to be able to interpret the meaning of data:

- **Data:** numbers, words, other evidence (e.g. behaviour)
- **Information:** data that is processed to be useful; provides answers to "who", "what", "where", and "when" questions
- **Knowledge:** application of data and information; answers "how" questions
- **Understanding:** appreciation of "why"

Planning (APM BoK 3.1.5)

“Planning determines what is to be delivered, how much it will cost, when it will be delivered, how it will be delivered and who will carry it out.”

APM BoK 6th Ed.

Planning occurs broadly at two levels: policy and delivery.

At the policy level a series of plans set out the principles of how each aspect of the work will be managed. These plans include documents such as the risk management plan, quality management plan and benefits management plan. They are sometimes referred to as strategies and include setting out procedures and processes for each management aspect. These further list preferred techniques, including document templates and defined responsibilities.

At the delivery level, documents answer questions such as:

Purpose	Description
'Why'	A statement of the reasons the project is required and includes a definition of the need, problem or opportunity being addressed. This is an expansion of the project's background and need as defined in the (outline) Business Case or project brief.
'What'	Describes the objectives, scope and deliverables of the project along with their associated acceptance criteria. It also describes the success criteria and the KPIs used to measure success on the project, taking into account factors that might influence its likely success (or not). These factors include any constraints, assumptions and dependencies.
'How'	There may be many alternate ways of delivering the stakeholder requirements. The 'how' documents the preferred strategy for the project along with the reasons for its choice and how it will be delivered, controlled and managed.
'How much'	The budgets, cash flows for expenditure and where appropriate income is included under this banner.

Purpose	Description
'Who'	The project organisation is defined along with key roles and responsibilities including how the required resources for the project are to be acquired. Typical tools could include an Organisation Breakdown Structure (OBS) or Responsibility Assignment Matrix (RAM).
'When'	A project schedule including key milestone dates, phasing and detailed timings for project activities required to complete the work.
'Where'	The geographical location of the project – where the work will be performed and the impact on costs and personnel. Considering whether the project is delivered at a single site or across multiple sites would have an impact on logistical planning.

This information is first developed during the Concept phase of the project life cycle in the form of an outline business case or project brief. When approval to proceed is given by senior management, detailed documentation for the preferred option is prepared during the Definition phase of the project life cycle. This is referred to as the project management plan (PMP)

Objective of the PMP

The PMP is essentially the “contractual agreement” between the project manager and the sponsor. The assembled PMP is a focal point for the project, documenting what will be delivered and how it will be managed in terms of the information detailed in the table above.

Content of the PMP

The specific content of the PMP may vary per industry sector and/or organisation. It is typical for the PMP to elaborate upon the information provided in the (outline) business case or project brief before the project work commences.

The detailed planning process will provide confidence that time and cost targets are realistic and that assumptions are well founded. It is important that the PMP verifies that the success criteria for the project is achievable. The PMP is best considered a box of documents that describe various aspects of the project rather than a single document in its own right.

It is released as a set of documents subject to version control with each sub document also under version control (see the topics on 3.2.3 Configuration Management and 3.2.2 Change Control)

The PMP also documents how the project will be delivered and managed. This might include the listing what controls are in place for the project, for example stakeholder communication and/or issue escalation processes. Organisational processes are also likely to heavily influence how the project will be delivered and relevant procedures may be included directly in the PMP or referenced from it.

At the end of the project one aspect of the post project review is to review the original version of the PMP and examine what changes have been made (if any) throughout the project life cycle.

Ownership of the PMP

The PMP is owned by the project manager who is responsible for:

- the creation of the PMP
- the accuracy of its content
- the maintenance of the PMP.

The project manager is unlikely to have all the skills and knowledge to create the entire PMP and therefore the team members may play a significant role in its creation in terms of providing information relating to:

- risk (especially those that are more 'technical' in nature)
- time and cost estimates
- success factors
- criteria relating to the quality and acceptance of the deliverables (obviously this will also have to be agreed with the sponsor and/or customer).

As previously stated, the PMP acts the formal agreement between the project manager and the sponsor. The sponsor must therefore formally 'sign-off' the PMP and when this has been done, the PMP represents the project baseline.

The sponsor may also provide input during the creation of the PMP, especially in relation to the relative priority of the requirements and the key constraints. Any controls and reporting requirements that need to be put in place should also be documented in the PMP and agreed with the sponsor.

During the implementation of the project, any changes that involve updates to the PMP must be approved by the sponsor prior to implementation. Finally, during project handover, the sponsor will use the PMP to appraise the performance of the project manager and the team before ultimately determining if the project has met the agreed success criteria.

The involvement of the customer in the PMP is likely to revolve around the identification of key constraints and the approval of satisfactory acceptance criteria. Additional involvement and responsibilities may be similar to that of the sponsor.

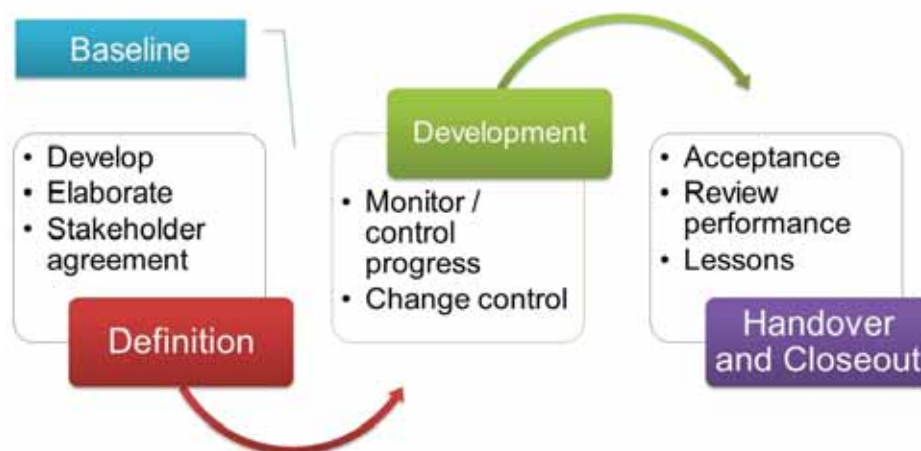
It is important that other stakeholders are granted access to the PMP as and when required ensuring that correct expectations are set before work actually commences on the project deliverables. These stakeholders may range from the Project Office (who may be required to approve that the PMP complies with agreed governance standards) to legislative bodies who may be involved in determining appropriate constraints.

Involving the project stakeholders in the creation and approval of the PMP will play a key part in obtaining their commitment and buy-in for the project.

Project Life Cycle and the PMP

Although baselined at the end of the definition phase, the PMP is a live document that will be kept up to date throughout the project with any changes being subject to the agreed change control and configuration management procedures.

The primary input for the creation of the PMP is the business case, the content of which is elaborated upon within the core content of the PMP. Multiple revisions of the PMP may be required as each stakeholder provides their input and feedback before the document is finally approved and baselined. It is likely that the business case will form part of the PMP although in some organisations the business case and the PMP are separate documents.



During the implementation phase, the PMP is used as the focal point for monitoring and controlling progress, stakeholder communication and managing change. At a minimum, the content of the PMP should be formally reviewed at each stage-gate to ensure its continuing validity.

Finally during the handover and closeout phase, the PMP is used as the formal mechanism for agreeing the acceptance of project deliverables as well as appraising the performance of the project manager and team in terms of their accomplishment of the documented success criteria. Lessons from the project may be referenced back to the PMP with possible changes to some of the related management plans being recommended.

Estimating

“An estimate is an approximation of project time and cost targets, refined throughout the project life cycle.”

APM BoK 6th Ed.

Types of Estimate

The two most common questions asked of any project manager are:

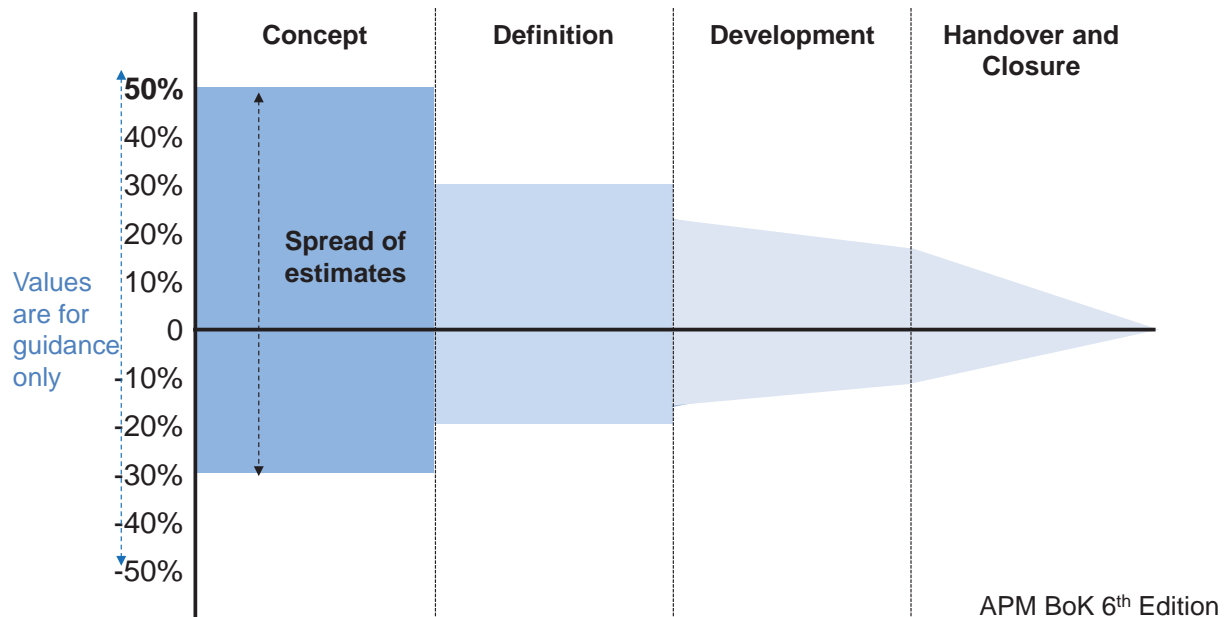
- How long?
- How much?

In order to answer these questions, the project manager must be able to provide quality estimates for the resources required for the project (these may include labour, materials etc.) and the durations for each activity.

At the start of the project uncertainty will be at its highest and therefore it may be very difficult to provide an accurate estimate with any degree of confidence.

Project Phase	Type of Estimate	Purpose	Accuracy (for example)	Comments
Initial concept	Proposal	Appraise feasibility	+/- 50%	Also known as a 'ballpark' or 'rough-order-of-magnitude'
Concept approval	Budgetary	Assess viability	+/- 20%	May be used in the approval of the Business Case
Definition	Sanction	Approve project	+/- 10%	Baseline cost and duration for project Allows 'real-work' to begin
Implementation	Control	Measure progress	+/- 5%	Used to delegate work and assess progress

The concept of the **Estimating Funnel** is particularly important for organisations that may be involved in technologically innovative projects or where significant uncertainty and risk may be present.



Estimating Problems

The experience and quality of the person providing the estimate will have a significant bearing on the quality of the estimate but there are a number of other generic sources of estimating error in projects.

- **Optimism / Pessimism:** Human or psychological factors may introduce significant bias to the estimating process. Although the typical bias is for the estimate to be over-optimistic, cultural factors may also be a contributory factor.
- **Social / political pressure:** Pressure from management, peers or even the client may influence the estimator into providing an 'acceptable' estimate. The project team is likely to feel the pain resulting from this practice later in the project.
- **Experience:** This may take the form of lack of technical expertise and/or knowledge of estimating as a skill. Training, mentoring and practice should help to build this experience over time.
- **Unclear scope:** It is very unlikely that any estimating process will provide an accurate estimate unless there is a clear understanding of the project requirements.
- **Source data:** Where comparative and/or parametric estimating is being undertaken, the quality of the estimate is predominantly determined by the quality of the source data. If inflationary factors or incorrect assumptions are not validated then it is probable that the estimate will be flawed.

Organisations that are new to project management or working on technically innovative and/or high risk projects may be especially susceptible to these issues.

Estimating Methods

The three primary estimating methods are outlined in the following table:

Method	Description	Strengths	Weaknesses
Comparative (also known as Analogous)	Assumes that the organisation has data (time and cost) from previous projects that can be used to produce a credible indicator for subsequent projects. In the absence of historical data, expert judgment may be used but with care.	Quick to produce. Reliable when a number of very similar projects have been undertaken previously.	Relies on expert judgment and/or accurate source data. Comparisons may be invalid where there are varying circumstances or conditions
Parametric	Also requires reliable historical data to produce reliable estimates. Typical attributes used to produce estimates will include lines of software code, cost / time per square metre etc. This technique uses statistical modelling software to produce overall estimates for time and cost.	Widely respected within certain industries. Can provide timely estimate with limited knowledge as long as source data is available. Can be used to verify estimates created by other methods. Can be very accurate when the basis of the data has been collected over time.	Industry norms (heuristics) must be kept up to date for factors such as inflation. Requires significant amount of historical data in order to define adequate norms.
Bottom-up	Detailed estimate is produced for each work package (or activity) and then rolled-up throughout the Work Breakdown Structure.	Accurate. Enables input from subject matter experts for each domain area	Takes time. Be aware that contingency may also be rolled-up.

Three-Point Estimating

This technique accepts the uncertainty involved in estimating and considers three estimates for any activity; a most-likely value as well as an optimistic and pessimistic value.

The three estimates can be used to calculate a **weighted average** (or PERT) estimate according to the following formula:

$$\text{PERT Duration} = \frac{\text{Optimistic} + (4 \times \text{Most Likely}) + \text{Pessimistic}}{6}$$

The reason for calculating weighted average is to provide an increased level of confidence in the estimate provided. The three values may then be used by software programmes to calculate the criticality of a single task and to quantify the overall project risk exposure. This is part of Monte Carlo Analysis performed during quantitative risk analysis.

Stakeholder Management (APM BoK 3.1.6)

“Stakeholder management is the systematic identification, analysis, planning and implementation of actions designed to engage with stakeholders.”

APM BoK 6th Ed.

Stakeholders are individuals or groups with an interest in the project, programme or portfolio because they are involved in the work or affected by the outcomes.

Stakeholders will ultimately determine the success (or otherwise) of your project. These individuals or groups must therefore be identified and analysed in order that their expectations can be met. Stakeholders could include individuals or organisations representing multiple groups who may be internal and/or external to the performing organisation.

Stakeholder Management Process

Stakeholder Management typically involves the following four steps. The actions shown under each step are not exclusive and may be supplemented by other relevant activities.

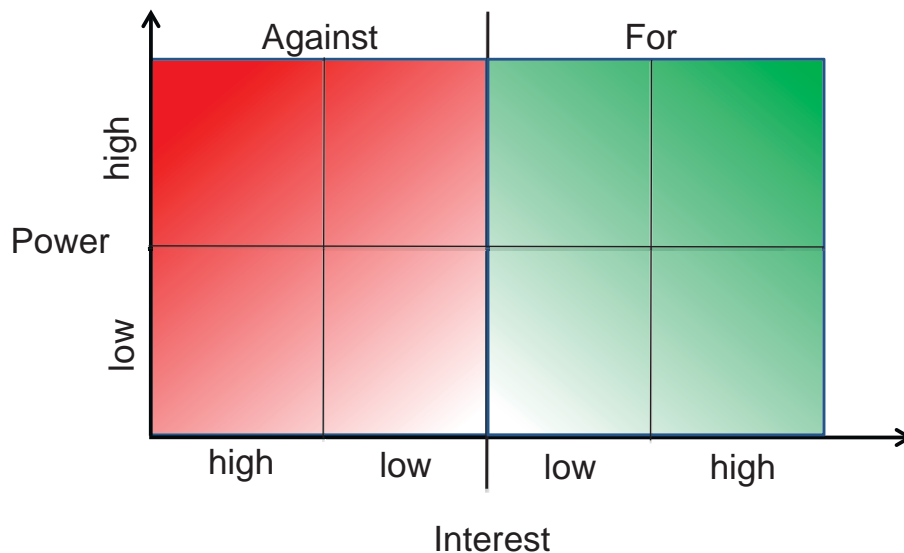
Phase	Actions
Identify	<ul style="list-style-type: none"> Research Brainstorming Interviews Check lists, e.g. from lessons learned in previous projects
Assess	<ul style="list-style-type: none"> Assess needs and expectations Determine relative levels of interest, power (influence) and attitude Classify stakeholders
Plan Communications	<ul style="list-style-type: none"> Determine appropriate communicate medium Agree responsibilities and timing for communications Create communications plan and link to other plans (e.g. information management, reporting)
Engage	<ul style="list-style-type: none"> Minimise resistance and increase support Influence, negotiate and deal with conflict Exploit support and manage resistance to change.

Although the stakeholder management process starts in the Concept phase, it is very much a dynamic and iterative function as opposed to being sequential in nature.

Stakeholder Map

In large stakeholder communities it is important to prioritise the key stakeholders in order that a project manager can dedicate an appropriate amount of time to communication and managing the expectations of the key stakeholders.

One common method of undertaking this prioritisation is to classify stakeholders according to their relative levels of power and interest in the project. This classification can be illustrated in graphical form through the use of a stakeholder map often shown on a simple 2 x 2 matrix. It is also possible to create a 4 x 2 map by further classifying whether stakeholders support or oppose the project.



Stakeholder Grid

Another method of stakeholder analysis is to use a stakeholder grid to show the areas of interest of each individual or group. This lists stakeholders along one axis and areas of interest along the other with an indication as to who has interest in each area. This could be further developed to show positive or negative opinion or to show the level of interest in each area.

	Public transport service	Housing	Local environment	City image / prestige	Sports facilities
Local Residents	✓	✓	✓	✓	✓
Transport Department	✓			✓	
Tourists	✓				✓

Stakeholder Management

Stakeholders must be managed to ensure that support is maintained and opposition to the project is removed, or at least minimised. Project managers will need to utilise a number of different management strategies to ensure that trust among the stakeholder community is built and maintained. A high degree of interpersonal skills will be required to negotiate with stakeholders internal and external to the organisation and to manage any conflict that might be generated.

The project manager will also need a full awareness of the contextual factors that may influence the project, not least of which will be the relative level of power the project manager possesses when compared to his or her stakeholders. Project managers may need to utilise the clout of their personal networks and/or undertake a certain amount of lobbying to ensure that achievement of the project objectives remains on track.

Stakeholder management might be formalised through the creation of a Stakeholder Register or Engagement Plan. Whatever methods are used, it is likely to be a very dynamic process as stakeholder interests and expectations will fluctuate throughout the project.

Stakeholder Management Benefits

It is clear that the project manager plays a key role in ensuring that the correct stakeholders are identified and prioritised in order that effective communication and stakeholder management takes place. Effective stakeholder management should help to realise the following benefits:

- **Increased support**
 - stakeholders who have a positive view on the project can prove to be valuable allies in negotiation and conflict situations

- **Access to resources**
 - project managers who actively manage stakeholder expectations have greater likelihood of gaining access to the key resources required to achieve the agreed project success criteria
- **Minimise resistance**
 - reducing the level of negative interest in the project will allow the project manager to focus on factors that positively contribute to project delivery as opposed to worrying about negative distractions
- **Deliverable acceptance**
 - stakeholders who have been fully consulted during the definition and execution of the project are more likely to feel that their needs have been considered and therefore more readily accept deliverables
- **Enhance and maintain communication**
 - a safe and trusting climate amongst the stakeholder community will help to foster open and timely communication leading to better decision making within the project
- **Improve quality**
 - ensuring that key stakeholders (e.g. end-users) are appropriately consulted will help to ensure that their needs are met and that project deliverables are indeed 'fit for purpose'.

Ultimately stakeholders have a key role in defining the project's success criteria and judging whether these criteria have been met or not. Their power, influence and interest cannot be underestimated.

Law (APM BoK 4.4)

“The relevant legal duties, rights and processes that should be applied to projects, programmes and portfolios.”

APM BoK 6th Ed.

Project managers must operate within the law and have an awareness of the legal systems in the jurisdictions in which they operate. Three obvious areas of the law that a project manager must take into account include:

- Health and safety legislation
- Employment legislation
- Contract legislation

Sectors such as the railways or the nuclear industry require a much wider knowledge due to the highly regulatory environment in which projects are delivered in these.

The project manager needs to be mindful that there are essentially two types of law in the UK, namely **criminal** and **civil** law.

Most project managers need to be concerned with civil law, although some breaches of civil law may constitute a criminal offence. A major breach of Health and Safety legislation that results in the death of an employee may provide grounds for prosecution on the criminal offence of manslaughter.

Civil law is governed by statute which is interpreted by the judiciary and legal precedents are established through case law. Most UK legislation is subject to the overriding authority of the European Parliament and the European Convention on Human Rights (ECHR). Of interest to the project manager here, will be the working time directive or the consolidated directive on procurement.

Failing to comply with civil law may result in punitive fines and compensation for the injured parties.

UK law governs England and Wales. Northern Ireland law governs Northern Ireland. Scotland has its own Parliament and jurisdiction, legislation and terminology. There is quite wide overlap, some fundamental differences do exist, particularly in relation to property and contract law.

In the light of this it is imperative that the project manager have an understanding of the relative contract law applicable, without necessarily being an expert in this field. Where projects are being undertaken on a virtual basis across a number of countries, potentially, a competent project manager will understand when to seek expert opinion and advice.

Additional areas that are of importance include the Data Protection Act and the Freedom of Information Act.



The Data Protection Act (2003)

The Data Protection Act controls how your personal information is used by organisations, businesses or the government.

Everyone who is responsible for using data has to follow strict rules called 'data protection principles'. They must make sure the information is:

- used fairly and lawfully
- used for limited, specifically stated purposes
- used in a way that is adequate, relevant and not excessive
- accurate
- kept for no longer than is absolutely necessary
- handled according to people's data protection rights
- kept safe and secure
- not transferred outside the UK without adequate protection

There is stronger legal protection for more sensitive information, such as:

- ethnic background
- political opinions
- religious beliefs
- health
- sexual health
- criminal records

When information can be withheld

There are some situations when organisations are allowed to withhold information, e.g. if the information is about:

- the prevention, detection or investigation of a crime
- national security or the armed forces
- the assessment or collection of tax
- judicial or ministerial appointments

An organisation does not have to say why they are withholding information.

Freedom of Information Act (2000)

The Freedom of Information Act 2000 was implemented to make public sector bodies more open and accountable. It is hoped that the public can better understand how public authorities operate by enabling greater access to information. It should enable a greater understanding about the duties of a local authority, the decisions they make and how they spend public money.

The act applies only to public authorities. If you are a private organisation, data can still be requested using a Subject Access Request under the Data Protection Act 1998.

If you are publicly funded, and your work is for the welfare of the whole population, you must comply with the Freedom of Information Act 2000. These organisations include government departments, local authorities, educational establishments, NHS GPs and dentists, police forces and health authorities.

In other words, if you are publicly funded, the public has a right to all information

What information is accessible?

The Freedom of Information Act gives any individual the right to access all recorded information held by public authorities. If you are a public body, this means any member of the public has the legal right to access all information regarding any subject matter. This could include your documents, emails, notes, videos, letters and even audio tapes.

This means the information does not have to have any association with the individual who has requested access and they do not need to provide any reason for their request.

In other words, you should be careful about what you say. Conversations and documentation should be monitored to ensure they are appropriate, with procedures in place to address any issues.

Health and Safety (APM BoK 4.2)

“Health and safety management is the process of identifying and minimising threats to workers and those affected by the work throughout the project, programme or portfolio life cycle.”

APM BoK 6th Ed.

The health and safety of all project team members (or any other individual who may be impacted by the project activities) is a basic legal right and the project manager must ensure that the risks to the health and safety of any person arising from project activities, are identified and controlled. This requires the project manager to have knowledge of the relevant legislation and organisational policies that govern this aspect of project activity.

The project manager and the team needs to:

- establish a health and safety policy and systematic implementation thereof
- utilise proactive and reactive performance measures to gain assurance of compliance
- measure effectiveness in driving good H&S performance

Projects may also be impacted by environmental legislation that place significant constraints on their execution and delivery. This legislation is typically specific to certain industries and types of project for example, construction, nuclear, chemicals amongst others.

All managers are responsible for ensuring that the work under their control complies with all relevant health and safety legislation. Managers play a critical role in leading by example and ensuring the team develops a good health and safety culture. In particular the manager should:

- have a good overview and understanding of the applicable legislation, but do not need to be experts in the field
- seek competent advice to assist them in discharging their duties
- understand their moral duty to protect people from harm
 - ensure the health and safety of the team
 - ensure that work is delivered in way that manages relevant risks throughout the life cycle
- understand the specific regulatory framework within which the project is being delivered – e.g. nuclear, railways, construction
- be aware of any applicable product safety legislation – particularly where a product is being produced in one country for use in a different country.

Two key pieces of UK legislation are the Health and Safety at Work Act 1974 and the Management of Health and Safety at Work Regulations 1999.

Health and Safety at Work Act (HSWA) 1974

The primary legislation that covers health and safety in the workplace is the Health and Safety at Work Act (1974). The Health and Safety Executive (HSE) is responsible for enforcing the act and providing relevant guidance to employers and employees. It is the duty of every employer; so far as is reasonably practicable, to ensure the health, safety and welfare at work of all their employees and also members of the general public who may be impacted by the organisation's activities.

The act has the following **primary objectives**:

- Securing the health, safety and welfare of persons at work
- Protecting persons, *other than persons at work*, against risks to health or safety arising out of or in connection with the activities of persons at work
- Controlling the keeping and use of explosive or highly flammable or otherwise dangerous substances, and generally preventing the unlawful acquisition, possession and use of such substances

As originally enacted, there was a fourth objective but this has now been repealed and is presently legislated by the Environment Protection Act (1990):

- Controlling the emission into the atmosphere of noxious or offensive substances

The HSE provides many useful resources concerning health and safety legislation and guidelines. The HSE has also prescribed the following list of responsibilities for employers and employees.

What employers must do for employees:

- identify what could harm employees in their job and the precautions to stop it. This is part of risk assessment
- in a way employees can understand, explain how risks will be controlled and state who is responsible for this
- consult and work with employees and health and safety representatives in protecting everyone from harm in the workplace
- free of charge, give employees the health and safety training they need to do their job
- free of charge, provide employees with any equipment and protective clothing needed, and ensure it is properly looked after
- provide minimum welfare facilities: toilets, hand washing facilities and drinking water
- provide adequate first-aid facilities
- report injuries, diseases and dangerous incidents at work to the HSE
- have insurance that covers employees in case they get hurt at work or ill through work. Display a hard copy or electronic copy of the current insurance certificate where employees can easily read it

- work with any other employers or contractors sharing the workplace or providing employees (such as agency workers), so that everyone's health and safety is protected.

What employees must do:

- follow the training received when using any work items the employer has given them
- take reasonable care of their own and other people's health and safety
- co-operate with their employer on health and safety
- tell someone (employer, supervisor, or health and safety representative) if they think the work or inadequate precautions are putting anyone's health and safety at serious risk

Source: www.hse.gov.uk

Managing Health and Safety: 5 Steps

Project managers have an obligation to proactively manage risk on their projects and this is most pertinent where team members' health and safety may be impacted. Managing health and safety is very similar to other areas of project management where a Plan-Do-Check-Act cycle forms the basis of the project manager's actions.

Set your policy

The organisation should have a documented policy that states how hazards will be identified and managed and who is responsible for managing health and safety on the project.

Organise your staff

A positive health and safety culture must be developed within the organisation ensuring the effective implementation of the four 'Cs' – competence, control, cooperation and communication.

Plan and set standards

Your plan will be heavily influenced by your policy (see step 1) and should document objectives and the process for identifying, assessing and managing hazards on your projects. Any standards set must be measurable, achievable and relevant.

Measure your performance

Project managers must ensure that health and safety is monitored on both a proactive and reactive basis. This means that the relevant standards must first be understood and the reasons for any variation between where you are and where you want to be, analysed and understood.

Learn From Experience (LFE) – audit and review

Monitoring allows the team to decide how to improve performance later in this project and also on future projects. This may involve reviewing and updating your policy and communicating these actions to the relevant parties.

HSE Actions

Recent years has witnessed much of the UK's health and safety law being heavily influenced by European law. When the HSE considers action is necessary to supplement existing arrangements, its three main options are:

Guidance

Following guidance is not compulsory and its main objectives are to help organisations interpret and comply with laws as well as providing technical guidance.

Approved Code of Practice (ACOP)

ACOPs provide guidance as to how to comply with a law (for example, specific advice on what is 'reasonably practicable'). Although not compulsory to follow, they have a special legal status in that, if they are found by a court not to have been followed, the organisation is liable for prosecution unless they can demonstrate compliance in some other way.

Regulations

Regulations are set by Parliament and must be followed. Some regulations are common to all organisations and others will be specific to certain industries.

Regulations supplement the HSWA and include:

- Management of Health and Safety at Work Regulations: require employers to carry out risk assessments, make arrangements to implement necessary measures, appoint competent people and arrange for appropriate information and training.
- Workplace (Health, Safety and Welfare) Regulations: cover a wide range of basic health, safety and welfare issues such as ventilation, heating, lighting, workstations, seating and welfare facilities.
- Health and Safety (Display Screen Equipment) Regulations: set out requirements for work with Visual Display Units (VDUs).
- Personal Protective Equipment at Work Regulations: require employers to provide appropriate protective clothing and equipment for their employees.
- Provision and Use of Work Equipment Regulations: require that equipment provided for use at work, including machinery, is safe.
- Manual Handling Operations Regulations: cover the moving of objects by hand or bodily force.
- Health and Safety (First Aid) Regulations: cover requirements for first aid.
- The Health and Safety Information for Employees Regulations: require employers to display a poster telling employees what they need to know about health and safety.

- Employers' Liability (Compulsory Insurance) Act: require employers to take out insurance against accidents and ill health to their employees.
- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR): require employers to notify certain occupational injuries, diseases and dangerous events.
- Noise at Work Regulations: require employers to take action to protect employees from hearing damage.
- Electricity at Work Regulations: require people in control of electrical systems to ensure they are safe to use and maintained in a safe condition.
- Control of Substances Hazardous to Health Regulations (COSHH): require employers to assess the risks from hazardous substances and take appropriate precautions.
- In addition, specific regulations cover particular areas, for example asbestos and lead, and:
 - Chemicals (Hazard Information and Packaging for Supply) Regulations: require suppliers to classify, label and package dangerous chemicals and provide safety data sheets for them.
 - Construction (Design and Management) Regulations: cover safe systems of work on construction sites.
 - Gas Safety (Installation and Use) Regulations: cover safe installation, maintenance and use of gas systems and appliances in domestic and commercial premises.
 - Control of Major Accident Hazards Regulations: require those who manufacture, store or transport dangerous chemicals or explosives in certain quantities to notify the relevant authority.
 - Dangerous Substances and Explosive Atmospheres Regulations: require employers and the self-employed to carry out a risk assessment of work activities involving dangerous substances.

Environment Management

Project teams also have a legal duty to consider the impact of their activities on the environment whether this relates to:

- Land
- Air
- Water

The Environment Protection Act (1990) provides legislation that governs the activities of organisations with specific chapters dedicated to:

Pollution

Part 1 defines the processes and limits for discharge of substances into the environment as well as influencing licensing conditions for organisations who are involved in this type of activity.

Land waste

The act imposes a duty on "any party who imports, produces, carries, keeps, treats or disposes of waste". Special conditions apply to areas of land or water where "significant harm" is a distinct possibility.

Nuisance

Part 3 of the act defines statutory nuisances and addresses areas such as smoke, smell, animals, noise and equipment that may impact public access. Litter is dealt with in a separate section within Chapter 4.

The remit of the EPA encompasses a broad range of activities covering everything from the control of radioactive materials to abandonment of supermarket shopping trolleys. The act is enforced by the Environment Agency (England and Wales) and the Scottish Environment Protection Agency.

Some organisations may wish to demonstrate their commitment to lessening the environmental impact of their activity by gaining ISO14001 accreditation. ISO14001 helps organisations by showing them how to measure consumption and reduce waste. Benefits should include real cost savings for the organisation as well as the obvious environmental benefits. ISO14001 follows a very similar approach to the five steps of managing health and safety and defines the following processes:

- General requirements
- Environmental policy
- Planning implementation and operation
- Checking and corrective action
- Management review

8. Scope Management

Coverage of Learning Outcomes:

- Product Breakdown Structure (PBS), Work Breakdown Structure (WBS)
- Configuration
- Requirements
- Change control, links with configuration.



Scope Management (APM BoK 3.2)

“Scope management is the process whereby outputs, outcomes and benefits are identified, defined and controlled.”

APM BoK 6th Ed.

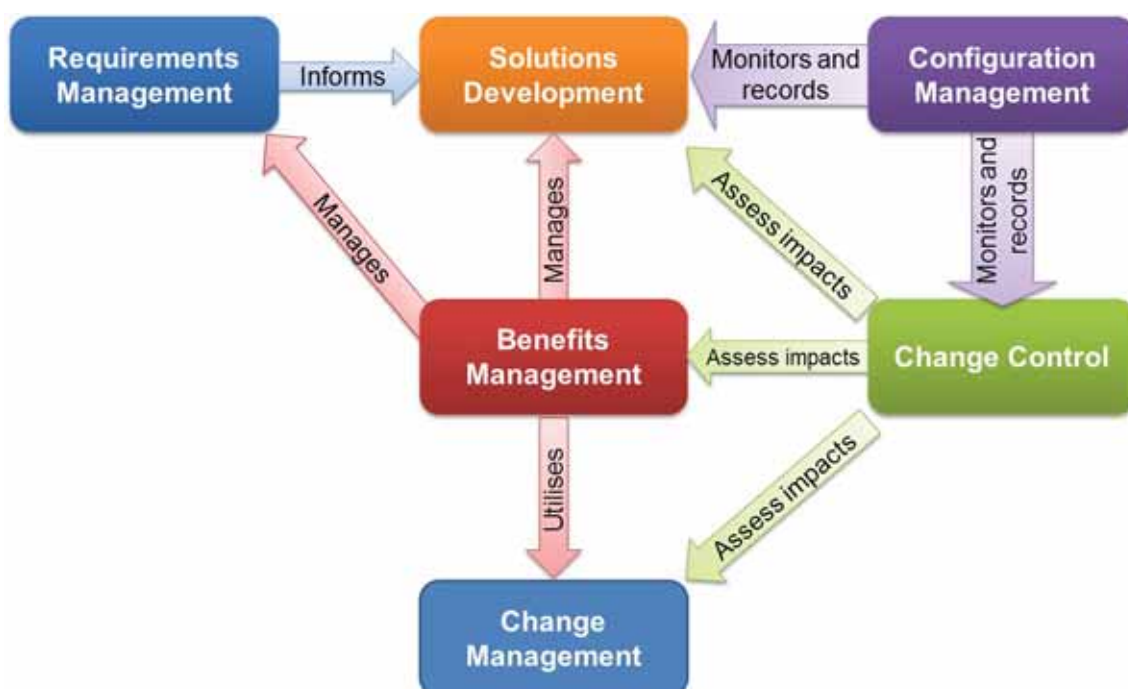
Identification and definition of the scope must describe what the project will include and what it will not include, i.e. what is in and what is out of scope.

Scope management forms an essential basis for the planning, monitoring, control and handover of the project. Without a clearly defined scope statement that is understood and agreed by the project stakeholders, it is very unlikely that a realistic schedule and/or budget will be created. Change control is also likely to prove problematic at best, and resulting conflict and confusion are almost inevitable.

Project scope includes the deliverables or services to be provided and also the work required to create these deliverables. Benefits may also be included in the scope of a project. The high-level scope will be defined in the Business Case and further elaborated within the Project Management Plan (PMP).

Scope Management

Scope Management is made up of six main areas that work together to identify, define and control scope:



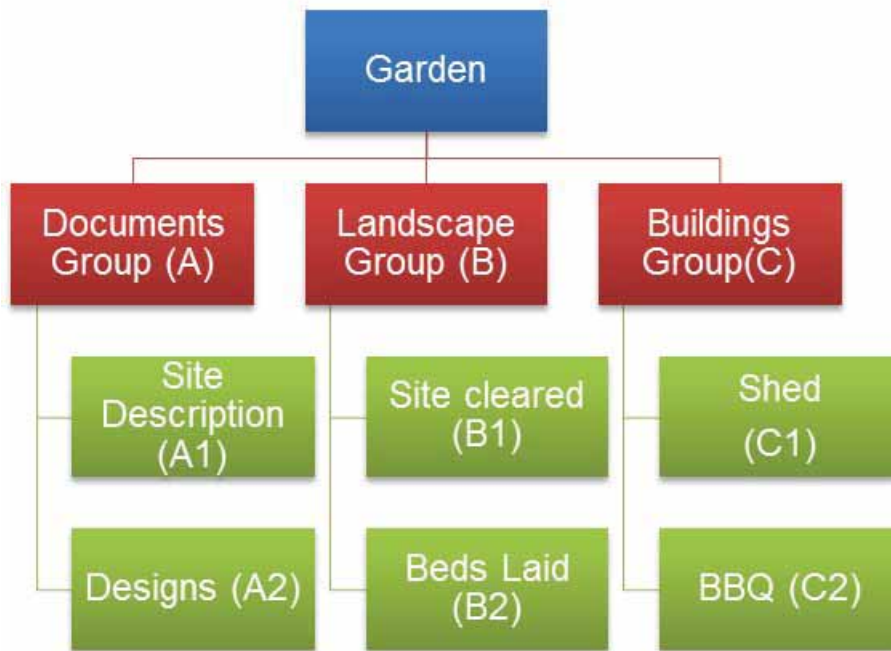
Requirements Management	Gathering and assessing stakeholders wants and needs. They should be solution-free, i.e. 'descriptive' not 'prescriptive'.
Solutions Development	Using the stakeholders requirements the project team considers how to achieve them in the most effective and efficient way.
Benefits Management	Taking requirements that have been expressed in terms of benefits and manages them through to eventual delivery. This runs in parallel with Requirements Management and Solutions Development, and utilises Change Management.
Change Management	Deals with the transformation of BaU needed to utilise outputs and realise benefits.
Change Control	The mechanism for capturing and assessing potential changes to scope, ensuring only beneficial changes are made.
Configuration Management	Monitoring and documenting the development or products. It makes sure that approved changes are recorded and superseded versions are archived.

A number of tools exist that help project teams define the scope of their projects.

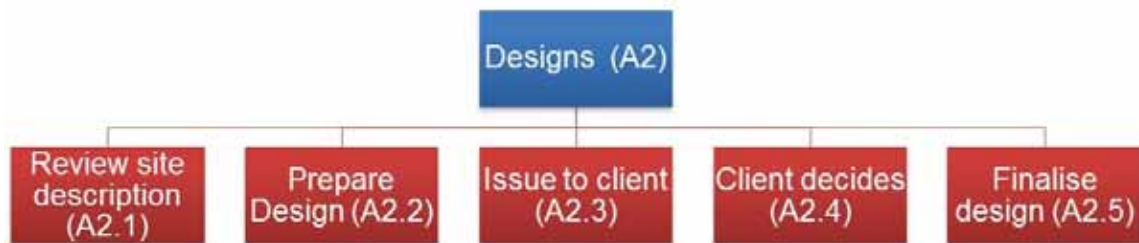
Product and Work Breakdown Structures (PBS, WBS)

The PBS and WBS are two of the most commonly used tools that help define and refine the project scope. Both tools are a hierarchical depiction of the project:

- PBS focuses on all the deliverables that the project will create (the lowest level being a deliverable)
- WBS also includes the work required to create the deliverables and can be structured upon a functional, product or life cycle basis (lowest level is typically a Work Package as refining the structure to 'activity' level can lead to a very complex diagram)
- teams commonly start with a PBS and then add the work required leading to a combined PBS/WBS diagram.



Within a PBS the lowest level is a ‘deliverable’. In a WBS it is a ‘work package’.



Work Package

Work Packages are the elements at the lowest level of detail in a WBS and include a collection of activities related to a specific deliverable(s). The work package content, degree of formality and level of detail will depend on each organisation’s requirements. They are likely to be more formal when working in virtual teams, when teams are less experienced and almost without exception, when work is allocated to a contractor external to the organisation.

Benefits of using a PBS and/or WBS include:

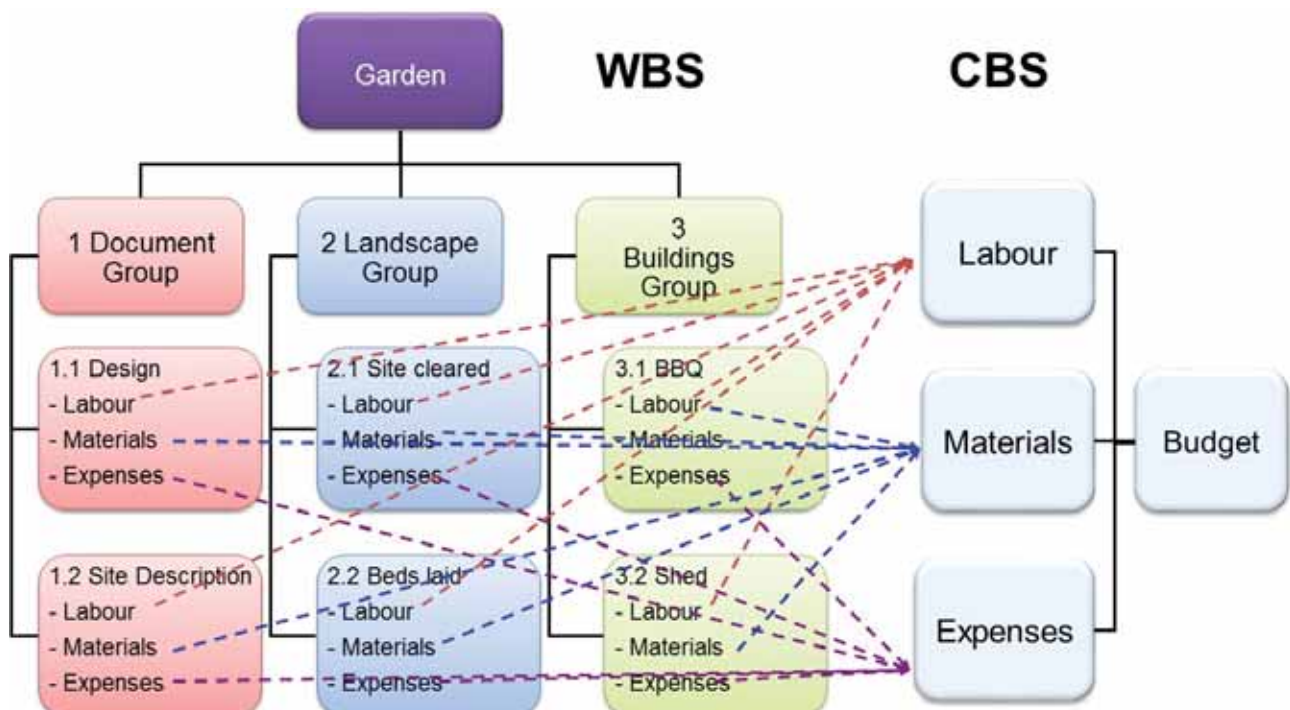
- forming the basis of effective planning and control (including cost control)
- fostering a common understanding of scope within the team
- providing an excellent communication vehicle, providing a structure for clarifying misunderstanding as to what is in and out of the project scope
- being used to discuss trade-offs and priorities
- being useful for delegating work to parties internal and external to the organisation
- providing a numbering system (code of accounts) that can be used to help track and control costs

Cost Breakdown Structure (CBS)

The CBS can show the individual costs assigned to work packages directly from the WBS. Alternatively a new structure may be formed that apportions and consolidated costs to pre-defined categories that help the organisation track and control costs.

Cost categories are defined within each organisation to suit its management accounting needs. Typically they include:

- labour
- consumables
- overheads
- contractors
- expenses



The costs are assigned to a cost centre and provide the basis of management information. Benefits of creating a CBS are similar to those listed for the PBS/WBS.

Organisation Breakdown Structure (OBS)

The OBS depicts the resources required to undertake a project. These resources are typically grouped together to form functional or management groups. The diagram also shows the hierarchy of roles and reporting lines and may be developed to also show communication channels. They are especially valuable when deciding how to delegate work amongst the project team.

Linking the OBS and the WBS (RAM Charts)

Topic 3.1.4 ‘Organisation’ describes how the WBS and OBS can be linked to form a Responsibility Assignment Matrix (RAM). This identifies the ownership and involvement in tasks of each of member of the project team. This is achieved through the use of ‘RACI’; Responsible, Accountable, Consulted and Informed.

	Define Deliverables	Develop Plan	Develop Schedule	Test Version A	Develop Interface	Live Test	Deliver to Customer
Sponsor	R	I				I	A
User	C		I		C		I
PM	A	A/R	A/R	A	A	A	R
Planner		C					C
Estimator		C					C
Contractor				R	I	R	
Expert			C	C	R		C
R – Responsible	A – Accountable		C – Consulted		I – Informed		

Scope Baseline

In the APM BoK 6th Edition, ‘Baseline’ is defined as:

“The reference levels against which a project, programme or portfolio is monitored or controlled.”

The term baseline can also be applied at a lower level than the whole project, for example to the scope and schedule.

The baselined scope that is agreed with the project sponsor is used to control requests for change and is invaluable in helping to prevent 'scope-creep' on the project. The agreed scope will also form the basis of the project plan and ultimately the project budget. The scope baseline is therefore an essential component in the implementation of effective cost control and Earned Value Management (EVM).

Requirements Management (APM BoK 3.2.5)

“Requirements management is the process of capturing, assessing and justifying stakeholders’ wants and needs.”

APM BoK 6th Ed.

As indicated in the summary above, a requirement is a statement of ‘want’ or ‘need’. Each requirement will have at least one acceptance criteria, which is the measure to demonstrate at handover that the requirement has been satisfied.

A well specified requirement is:

- **uniquely identifiable:** it addresses only one core requirement;
- **current:** it is up to date and relevant to the business need;
- **consistent:** it does not contradict any other requirement;
- **understandable:** concisely stated and not open to different interpretations;
- **verifiable:** compliance can be verified through inspection, demonstration, test or analysis;
- **traceable:** the requirement can be traced from the originating need, through the plan, to what is delivered;
- **prioritised:** its relative importance is understood

Expending effort in the early stages of the project to identify its true purpose – that is, what is required (as opposed to how it will be delivered) – is perhaps the best way of increasing the likelihood of project success. It should be recognised that this effort is almost wholly reliant upon effective stakeholder identification and management which is when the client’s needs are analysed and translated into a set of detailed requirements.

Requirements are needed for a variety of purposes including:

- scoping the project
- estimating time and cost
- change control
- customer acceptance

Although the project manager is ultimately accountable for the accurate definition of the requirements, in certain industries the bulk of this work is carried out by a Business Analyst.

Requirements Model

Requirements are progressively elaborated throughout the project life cycle. The requirements documentation may comprise of the following distinct content:

Stage	Description
Business Need (Why)	Multiple techniques might be used to elicit the users' requirements including interviews, brainstorming, focus groups, prototype models, questionnaires and story-boarding. Care must be taken to identify stakeholders' true needs which might be quite different from what they are actually asking for.
Features (How)	The business need should not indicate a specific solution whereas the product features will indeed define <i>how</i> this need will be satisfied.
Requirements (What)	Requirements will help the project team understand exactly what is to be provided and forms the basis of the project scope. Requirements must be clearly defined, consistent (with other requirements), complete, traceable and verifiable (i.e. it is possible to determine that the system meets each requirement).
Acceptance Criteria	Each requirement should have clearly defined acceptance criteria in order that there is no ambiguity as to whether the requirement has been satisfied or not.

Types of Requirements

Once the project's needs and features have been established, the team will create a requirements specification that will define what is actually required as (in addition to how it will be delivered). The solution requirements often are separated into the following categories:

	Functional	Non-functional
Description	Functional requirements state exactly what the system should do in any given situation. It is a binary state (yes/no, does/does not)	Non-functional requirements specify the attributes that the system must possess. Sometimes these requirements are known as quality attributes.

	Functional	Non-functional
Examples	<ul style="list-style-type: none"> ▪ Inputs, outputs and behaviours of the system ▪ Use cases ▪ Business rules 	<ul style="list-style-type: none"> ▪ Usability ▪ Reliability ▪ Performance ▪ Supportability ▪ Security

Requirements Management Process

Requirements management involves the following steps:

- **Capture:** Capturing, documenting and structuring the requirements (and also its associated acceptance criteria).
- **Analysis:** Analyse to look for overlaps, gaps and conflicts and prioritise requirements based on their ability to realise benefits whilst taking the project context into account (business priorities, availability of resources, available budget etc.).
- **Justify:** The structure and content of the documented requirements should be reviewed by the stakeholders to make sure it accurately reflects their wants and needs and distinguishes between them. Functional requirements are relatively easy to test – ‘functional’ means that something happens or doesn’t. Non-functional are not easy as they are qualitative. They often involve words like ‘easy’, ‘simple’ or ‘fast’. For non-functional a range of attributes have to be defined that show how the qualitative word is measured, e.g. how speed is ‘fast’, what will be the evidence that something is ‘easier’?
- **Baseline:** Once agreed the requirements should be baselined and become subject to formal change control procedures.

Each requirement may also be structured around their respective:

- **Value:** How large is the benefit associated with each requirement
- **Priority:** What do stakeholders feel are the most significant requirements (see MoSCoW)
- **Time:** Business timescales will play a large part in determining the priority of requirements
- **Process:** How will the project team deliver the solution (for example, through the use of specialist sub-contractors)

Competing Requirements

Different stakeholders will have different interests that may occasionally prove to be unrealistic. Project managers must ensure that expectations are correctly managed. Prioritisation of requirements is often required to ensure that stakeholders understand what is to be delivered and within what timeframe. One way in which this can be done is using 'MoSCoW'.

M	Must: non-negotiable requirements without which, the project is unviable
o	
S	Should: should be provided if at all possible
C	Could: 'nice-to-have' if nothing else is impacted and time/budget is available
o	
W	Won't: very important in order that stakeholders have a good understanding of the project scope

The Importance of Requirements Management

Effective requirements management is fundamental to the success (or otherwise) of the project. Each of these areas is intrinsically linked to requirements management.

Scope: The requirements form the basis of the project's scope (i.e. what is actually going to be delivered and the work required to deliver the product). Having a good understanding of the business need will help define the most appropriate requirements as early as possible in the project life cycle.

Quality: Without this understanding, the quality (or 'fitness-for-purpose') of each deliverable may be significantly undermined.

Change control: Changes to the project scope will also have an obvious impact on the project requirements and part of the impact analysis should determine what effect any change has on the project's requirements, feature set and ultimately, its ability to satisfy the stated business need.

Value Management

The concept of Value is based on the relationship between satisfying needs and expectations and the resources required to achieve them. The aim of value management is to reconcile all stakeholders' views and to achieve the best balance between satisfied needs and resources

Value Management is concerned with improving and sustaining a desirable balance between the wants and needs of stakeholders and the resources needed to satisfy them. Stakeholder value judgments vary, and value management reconciles differing priorities to deliver best value for all stakeholders.

Configuration Management (APM BoK 3.2.3)

“Configuration management encompasses the administrative activities concerned with the creation, maintenance and controlled change and quality control of the scope of work.”

APM BoK 6th Ed.

The configuration of a project comprises the physical components and documents that are created during a project. Controlled management of these configuration items (or assets) is essential if the final deliverables are to comply with the agreed specification and the customer’s requirements. A project’s assets might include physical components, hardware, software, specifications, design drawings, etc.

Configuration Management Process

Configuration management consists of the following five key activities.

Activity	Description
Planning	The configuration management plan should provide guidelines for the level of configuration management required by the project. The plan will document how we will protect the project’s assets including any specialist tools to be used along with the associated roles and responsibilities. The identification scheme for the configuration items is defined.
Identification	Each configuration item (CI) will require some form of unique identification as well as the documenting of any related attributes (e.g. type of item, owner, status, version, relationship with other items etc.). The PBS is used to determine the CIs.
Control	The configuration baseline should be protected throughout the project. Any changes must only be implemented and approved by authorized parties. Storage of configuration items must also be controlled and access restricted where appropriate to do so (including archived items).
Status accounting	The current status and version of each item must be recorded and monitored. Any changes must be documented to enable tracking of an item’s status during its development. It is typical for project managers to use a register of assets to ensure that their present status is clearly visible (this register is sometimes known as a product status account).

Activity	Description
Audit	At a minimum, the project's assets should be reviewed at each stage gate to ensure that their actual status aligns with the presently authorised version. This is particularly important at project handover to ensure that the latest version of each project asset is delivered.

Configuration Management Roles

Roles and responsibilities associated with configuration management will vary across different organisations. Typical roles might include:

- **Configuration librarian:** Ensures that any asset entered into the 'library' conforms to the agreed guidelines. The librarian will also control access to the master copies of any live and/or archived configuration items
- **Configuration administrator.** Supports the process through the administration of formal change requests and the updating of configuration item records and/or the product status account
- **Configuration item owner:** Has primary responsibility for any single configuration item and may be responsible for the approval and implementation of any approved changes
- **Project manager:** Ensures that a process is in place and is ultimately held accountable for the product deliverables conforming to the latest specification (including the implementation of any agreed changes)
- **Quality Assurance (QA):** QA may support the entire process and help in the creation and management of a configuration management database (CMDB). Another key role of QA could be the auditing of selected projects to ensure that the correct versions of the project assets are being used.

Other roles that could be considered may include a configuration manager is who is responsible for the organisation's configuration management process, team members who need to follow the process, configuration control board etc.

Configuration Management in Context

Any configuration management process must be very closely linked to the change control and information management processes (including version control). Changes to any deliverable and/or project document must be recorded, evaluated, authorised, and implemented in accordance with the agreed procedures and communicated to the relevant stakeholders.

Change Control (APM BoK 3.2.2)

“Change control is the process through which all requests to change the baseline scope of a project, programme or portfolio are captured, evaluated and then approved, rejected or deferred.”

APM BoK 6th Ed.

The unique and uncertain nature of projects infers that change is highly likely at some point in the life cycle. Effective change control ensures that the stakeholders understand and agree the baseline scope and that a formal process for controlling changes is implemented throughout the project. Uncontrolled change is one of the most common reasons for project failure and the goal of change control is to ensure that you manage change on the project as opposed to allowing change to manage you.

The primary purpose of change control on a project is to ensure that only beneficial changes are allowed. This does not mean that all changes are positive; it means that if the change were not done the project would be in a worse position. For example, new legislation may mean that a project has to undertake additional work, increasing time and cost. However, if the change was not done the product would not comply.

Ultimately change control protects the project scope and baseline from unauthorised change. Change is inevitable, but only authorised changes should be implemented. Unauthorised changes can lead to configuration problems, increase project risk, cause scope creep and lead to a project failing to complete its objective.

Sources of Change

Any stakeholder may request a change to the project. The stakeholder may be internal or external to the delivery organisation and this is likely to play a major part in determining who funds the change.

Internal changes:

- **technical error:** errors may result in rework or waste costs that will need to be funded from the project's baseline budget.
- **incorrect estimate:** estimating problems may arise from not fully understanding the project scope or possibly from inexperience in the estimating process.
- **resourcing issues:** committed resources may be subject to re-prioritisation due to issues in other projects and/or business-as-usual activity. Externally sourced resources may also be subject to changes which might be largely outside the project manager's control.

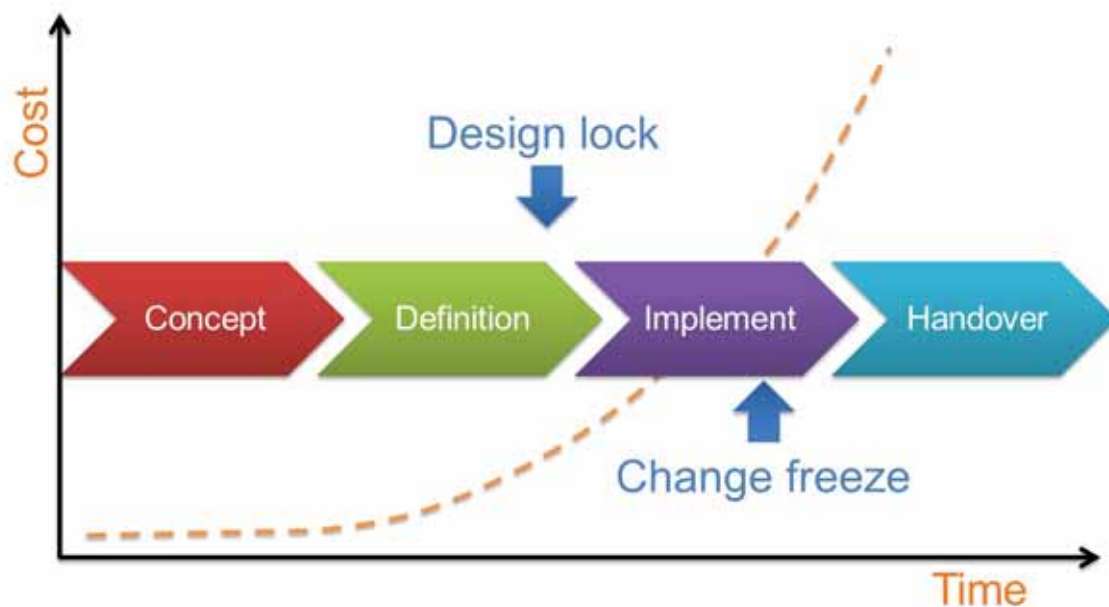
External changes:

- **business justification:** changes in a potential market (e.g. increase in the price of outsourced services) may have a major impact on the business case for the project. major changes to the project scope may be required to ensure that the business case remains viable.

- **requirements change:** closely linked to threats to the project's business case, requirements may be subject to alteration if there is a change in a potential market and/or if competitor activity is likely to affect the business justification.
- **technology or market shift:** The introduction of new business processes and/or new technology may be an opportunity that can be exploited by the project.

Cost of Implementing Change

The ability for stakeholders to influence the project's requirements is highest during the early part of the life cycle and change at this stage is less likely to have a significant impact on the agreed budget. The cost of implementing change will rise substantially as the project nears completion with major rework and/or waste probable.



Change control requires that the scope of the project is fully agreed by the stakeholders and a solid baseline documented in the Project Management Plan (PMP). This is often the trigger for the design to be 'locked' and formal change control to be introduced, subsequent requests for change being managed through the agreed process. Updates to the requirements and/or PMP need to be effectively communicated to the relevant stakeholders – configuration management will also play a large part in the control of the project's assets. Implementation of formal change control too early in the project is likely to prove unsuccessful due to the high level of change and clarification during the initial definition of the requirements and/or scope.

Where further change is likely to threaten achievement of the project's objectives, a change freeze may be introduced where additional changes will no longer be considered. This is most likely to take place near the delivery of interim and/or final deliverables. In certain circumstances a change freeze may be introduced on certain

dates, for example during holiday periods where resources are not available to evaluate and implement change.

The Change Control Process

The change control process will be included in or referenced from the PMP. It ensures that all changes are recorded, evaluated, authorised and implemented in a controlled manner. A typical change control process is likely to comprise the following key stages:

Stage	Description
Request	The person or body requesting the change provides the necessary information for the change to be entered into the Change Register. This usually takes the form of a formal Change Request form.
Review	This is the first part of a two-stage process to determine whether to proceed with the change. The initial review will consider at a high-level the impact on outputs and benefits, and determine whether a full evaluation is required or desired. An early rejection of the change is possible at this stage to prevent significant effort being consumed in the evaluation. Assuming the change is deemed worthy of consideration, a full assessment of the change is undertaken.
Assessment	All options relating to the change – including the ‘do nothing’ option which should always be considered – are evaluated and a detailed impact time, cost, quality, plans, schedules and other key areas is examined. In order to allow the Sponsor (or designated change authority) to make an informed decision, it is common for the project manager to recommend acceptance, deferral or rejection of the request, or request more information.
Decision	The decision is communicated to the team and stakeholders as outlined in the communications plan.
Implementation	If the change is authorised all relevant plans should be updated to include the new agreed activities. Where the change is funded by the customer, it is typical for the agreed objectives (time, cost, quality) to be re-baselined at this point. The new plan is implemented and careful analysis of the effectiveness of the change is undertaken.

Where changes have been implemented without undergoing the agreed process, the change should still be evaluated and authorised retrospectively.

Change Documentation

Formal recording of change will help the organisation comply with internal/external legislation as well as adhering to the fundamental principles of configuration management.

Detailed documentation of the requested change in a change request form (CRF or RFC) ensures that stakeholders have an accurate understanding of the rationale behind the change and have full knowledge of its resultant impact. The change request may also indicate the priority of changes (for example, through the use of the MoSCoW prioritisation tool – ‘Must’ have, ‘Should’ have, ‘Could’ have and ‘Won’t’ have for now).

The Change Log (or Register) keeps a summary of all change requests and whether they were authorised or not and provides an audit trail of requested changes and their history. This is useful for helping to identify lessons learned on the project.

Change Control Responsibilities

More than one person or body is likely to be involved in the evaluation and approval of change requests.

Corporate or Programme Management

The members of this group are focused on the business case. They will want to keep costs down on the project but maximise benefits received from the end product. These people have the final say as to whether a change is approved or not. They may delegate some of that responsibility so that they are not swamped with minor changes and only deal with major change requests.

Sponsor

The Sponsor may have delegated powers from corporate or programme management to authorise change but if the change requests have a strategic impact they will have to go back to the ultimate customer for the project.

Project Manager

The project manager must ensure that change control and configuration management procedures are in place. On smaller projects it will also be the Project Manager’s job to operate these procedures. It is also important that the Project Manager clearly establishes who is responsible for authorising various types and levels of change.

Users

The bulk of the change requests will come from the end users of the project’s products. The users will probably be involved in testing the end product. Once the project is under way they will also have plenty of time to think about how they

are going to use it. Inevitably, as they see the first results, they will have ideas on how things could be improved. The whole point of the change control process is to capture the good ideas and discard the unnecessary ones.

Project Team Leaders

The main focus of the project management team is to ensure the change control process works smoothly. The main effort will be in the assessment of change requests, confirming approval or rejection, updating plans and finally ensuring that the work is done. Where there is a project support office, most of this work will be done by that group.

Project Team

The assessment of change requests may need significant technical input and this is likely to come from the project team. Some project teams are obstructive and others are too willing to accommodate changes. Both attitudes are potentially damaging to the project.

Some subcontractors or suppliers may bid for their contract at very low margins in the expectation that they can make their profit on the inevitable list of change requests. The approach to change control in sub-contracts must be covered in the contract documentation and backed up with practical control systems.

Project Support

Administrative support will be needed for the activities involved in assessing changes and recording information in the configuration management system. If a project support office exists then it will perform these duties. Ultimately, it is the Project Manager's responsibility to ensure that this job is done.

Project Assurance

It is the sponsor's responsibility to ensure that the project manager is implementing adequate change control procedures for the project. The responsibility for checking this is often delegated to a project assurance team or individual.

External Stakeholders

Most external stakeholders will not submit formal change requests; they are not involved in that level of detail. The influence of these stakeholders comes in less formal ways. A local resident may object to some aspect of a construction project; a regulatory body may issue new guidelines; a supplier could launch new technology. All of these things could lead to change requests but the need for these requests must be identified and actioned by people closer to the project.

Change Control and Configuration Management

Request

When a change request is received, it must be registered. Registration information will be stored in the configuration file for the configuration items affected.

Review and Assessment

The assessment of the proposed change must be undertaken using the current baseline. Where the change is directly related to a deliverable this will be obtained from the configuration management library for the item. The time, cost, scope, quality and risk impact of the requested change will be considered, along with any other relevant areas. The configuration items are usually frozen as any work carried out on them may have to be undone if the change is approved.

Decision

If the change is accepted, that will be recorded in the configuration file. Anybody wishing to use the item will then know from the files that the item is currently being changed and cannot be used for any other purpose.

Implement

The configuration file may be updated with summary progress information on the implementation of the changes (detailed information will be in the updated plans).

Finally, when the revised configuration item is complete and authorised, it becomes the new baseline version and further change requests would trigger the process once again.

Throughout this process, the configuration management system must ensure that:

- configuration items are only released to one person at a time for change
- baselined items are stored securely
- retrieval mechanisms are in place
- for software/documentation type items: they are backed up to enable disaster recovery
- for items that are distributed: new baselines are distributed to recorded recipients and old copies preferably destroyed
- access controls are in place, e.g. for commercial confidentiality.

9. Schedule and Resource Management

Coverage of Learning Outcomes:

- Project scheduling
- Categories and types of resources
- Resource smoothing and levelling
- Financial and cost management
- Budget and cost control.



Time Scheduling (APM BoK 3.3.2)

“Time scheduling is a collection of techniques used to develop and present schedules that show when work will be performed.”

APM BoK 6th Ed.

“Scheduling is the process used to determine the overall project duration and when activities and events are planned to happen. This includes identification of activities and their logical dependencies, and estimation of activity durations, taking into account requirements and availability of resources.”

APM BoK 5th Ed.

Arguably the two most common questions asked of any project manager are:

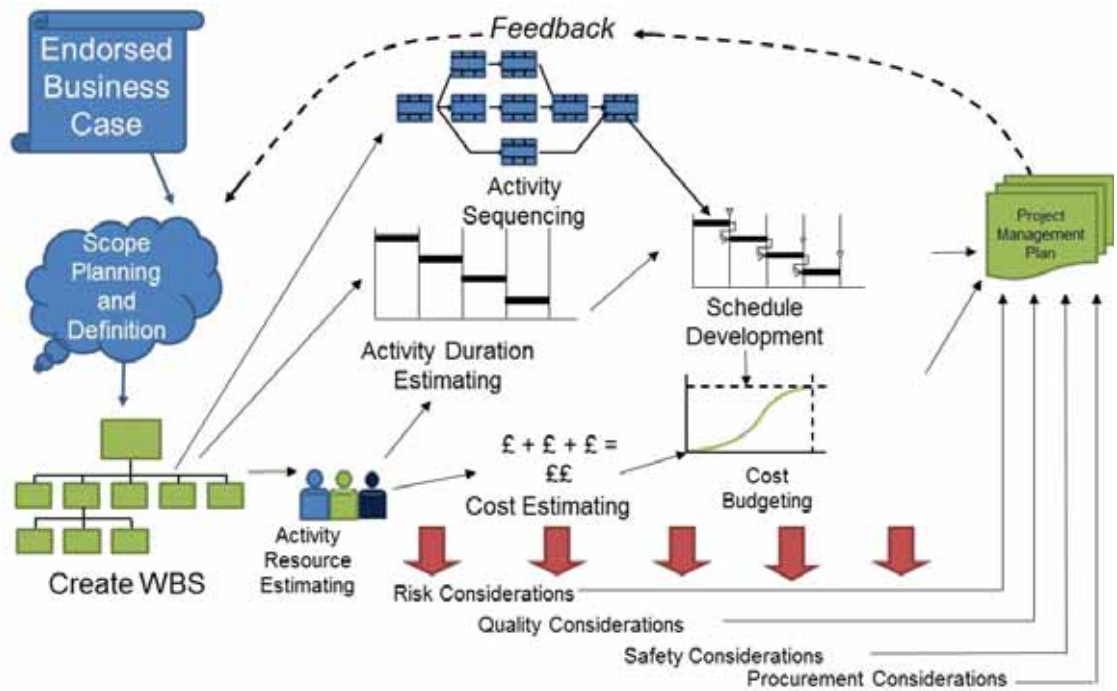
- How long?
- How much?

This module takes delegates through the process of creating a project schedule from first principles. We discuss a number of techniques that may be used to ensure you have a realistic timeframe for your project.

Planning Process

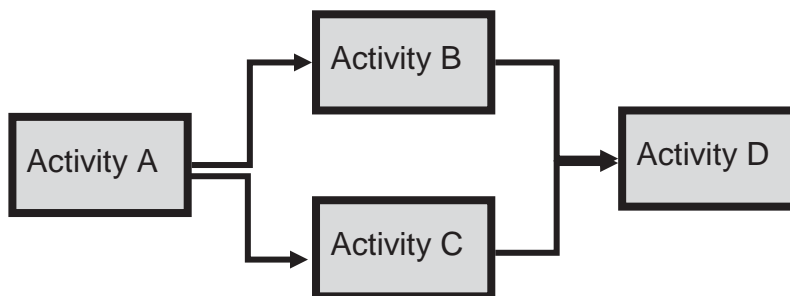
Once the outline business case for the project has been developed, a plan for the project can be developed and typically comprises a number of steps:

- defining the project scope through the use of a work breakdown structure
- identify the activities required to create work packages then determine their logical sequence
- estimating the durations of activities thereby allowing a schedule to be created
- determining the resources required and their availability
- estimating the cost of the resources allowing a cost budget to be created
- throughout this process, other constraints must be take into account such as risk, quality, procurement and HSE
- this process will culminate in a baseline plan for the project being created. Note that the above steps are not sequential and multiple iterations of each step are likely to be required.



Network Diagrams

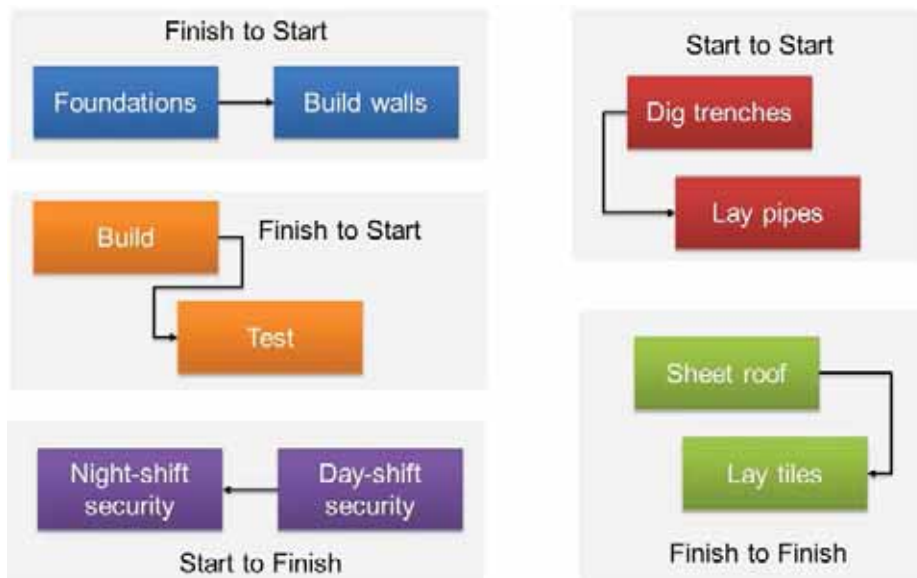
Using the work packages identified in the WBS the network diagram defines the sequence in which the work packages will be carried out. The technique is also referred to as the Precedence Diagramming Method (PDM) or Activity-on-Arrow (AoA) networks diagramming. This method represent the activities as boxes or nodes with relationships shown as the logic connections between the boxes.



Logical Relationships

Networks can be created that only use simple 'finish-to-start' relationships. In more complex projects a number of different logical relationships may be present.

Relationship	Description
Finish-to-Start	Predecessor activity must finish before the successor activity can start (most common relationship)
Start-to-Start	Predecessor activity must start before the successor activity can start
Finish-Finish	Predecessor activity must finish before the successor activity can finish
Start-to-Finish	Successor activity must start before the predecessor activity can finish (very rare)



Network diagrams can be further enhanced through the addition of lags and leads to specific logical links:

- **Lag:** creates a defined delay in the relationship (represented by the inclusion of a '+' sign accompanied by the required time delay)
- **Lead:** indicates an overlap between two linked activities (represented by the inclusion of a '-' sign accompanied by the required time overlap)

Network Analysis

The British Standard for representing a network node is depicted in the graphic. (Note that project planning software conventions may be different).

ES	D	EF
ID Description		
LS	TF	LF

- ES = Earliest Start
- D = Activity Duration
- EF = Earliest Finish
- LS = Latest Start
- TF = Total Float
- LF = Latest Finish

Calculations

The start and finish dates of activities in the project are calculated in two passes. The Forward Pass calculates ‘Early Start’ (ES) and ‘Early Finish’ (EF) dates, starting at the first activity and working through to the last activity in the network.

For ease of calculation, the first activity starts at time 0. The Backward Pass calculates the ‘Late Start’ (LS) and ‘Late Finish’ (LF) dates of activities from the final task backwards and for ease of calculation, the ‘Late Finish’ on the last activity is set equal to the ‘Early Finish’.

Forward Pass:	Early Finish = Early Start + Duration (ES + D)
Backward Pass:	Late Start = Late Finish – Duration (LF – D)

Where a successor task on the forward pass has two predecessors, the latest ‘EF’ must be chosen, that is, the EF with the higher value. When a predecessor task on the backward pass has two successors, the smallest ‘LS’ value is used.

To help you remember ‘Highest number forward, lowest number back’, think ‘Big steps forward, small steps back’.

Once both passes are complete, it is possible to determine the amount of float time per activity. Two types of float are generally considered:

- **Total Float:** The amount of time an activity can be delayed or extended without affecting the total project duration (end date).
- **Free Float:** The amount of time an activity can be delayed or extended without delaying the start of the succeeding activity.

Total Float:	<p>If the activity has a simple Finish to Start dependencies with predecessors and succeeding activities, the following formulae may be used:</p> $\begin{aligned} \text{Total Float} &= \text{Late Finish} - \text{Early Finish} \\ &= \text{Late Start} - \text{Early Start} \end{aligned}$
Free Float:	$\text{Free Float} = \text{Early Start of next task} - \text{Early Finish of current task}$ <p>Where a task has two successors the time difference between the tasks may be different; the free float (if any) will be the lower of the two numbers calculated.</p>

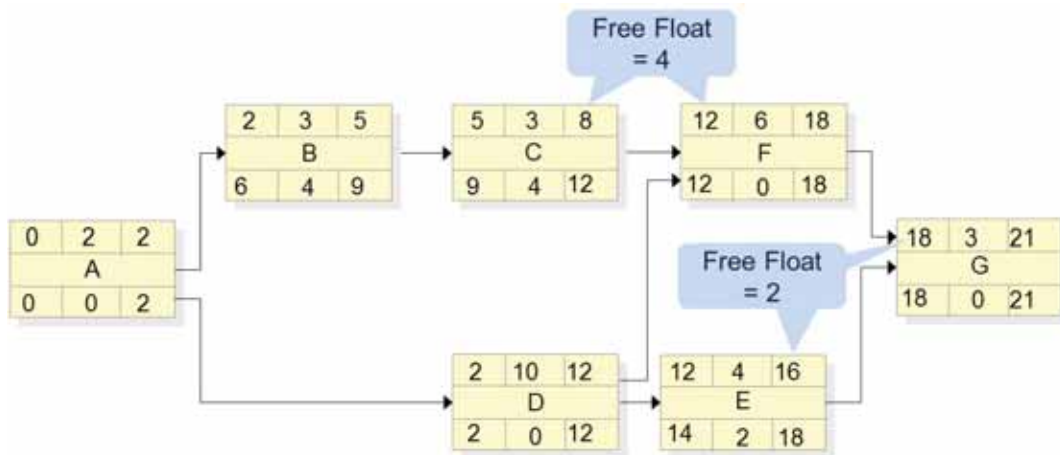
Critical Path: The APM BoK defines the critical path as the “Sequence of activities through a project network from start to finish, the sum of whose durations determines the overall project duration”. It is identified on a network diagram as the path with the least total float, but generally has zero total float.

There may be more than one such path.

Note: If you are undertaking the APMP exam where a question asks you to draw a network diagram make sure you draw the diagram with the legend key shown and write down the governing equations.

The critical path shows the project team which activities require the greatest focus if the planned project duration is to be achieved. The project duration can only be shortened if the durations of activities on the critical path are reduced, and any increase in the duration of any activity on the critical path will cause the project duration to increase.

However, the critical path does not necessarily indicate the most difficult activities, or those with the greatest risk. The critical path focused solely on time sensitivity.



Use of Critical Path

The critical path is very important in projects for a number of reasons:

- to concentrate attention on activities which, if delayed, will affect project duration
- to identify 'near or sub critical' activities – those with very little float may require similar attention to critical path activities
- to identify 'bulk work' activities – those with large float:
 - these can be used to smooth forecast resource usage
 - they help identify where resources can be switched between bulk and critical activities to maintain progress
- the critical path can be aligned with key milestones which is useful when reporting progress
- risks associated with critical path activities may have a higher impact (especially with respect to time).

PERT (Programme Evaluation and Review Technique)

During the 1950s on the design and production of the first nuclear powered submarine, an alternative approach to determining project durations, referred to as PERT (Programme Evaluation and Review Technique) was developed.

Rather than use a simple single point estimate for activity durations, a figure is derived using the three-point estimate technique⁴. The three points are based on an Optimistic Duration (shortest time), a Pessimistic Duration (longest time) and a Most Likely Duration. The latter is not necessarily the average of the longest and shortest durations.

The PERT duration is calculated according to the following equation and represents a weighted average of the three points:

$$\text{PERT Duration} = \frac{O + (4 \times \text{Most Likely}) + P}{6}$$

Note that three point estimating is also used, though in a slightly different manner, during Quantitative Risk Analysis (QRA) as part of Monte Carlo analysis to quantify the total risk exposure due to uncertainty on the project.

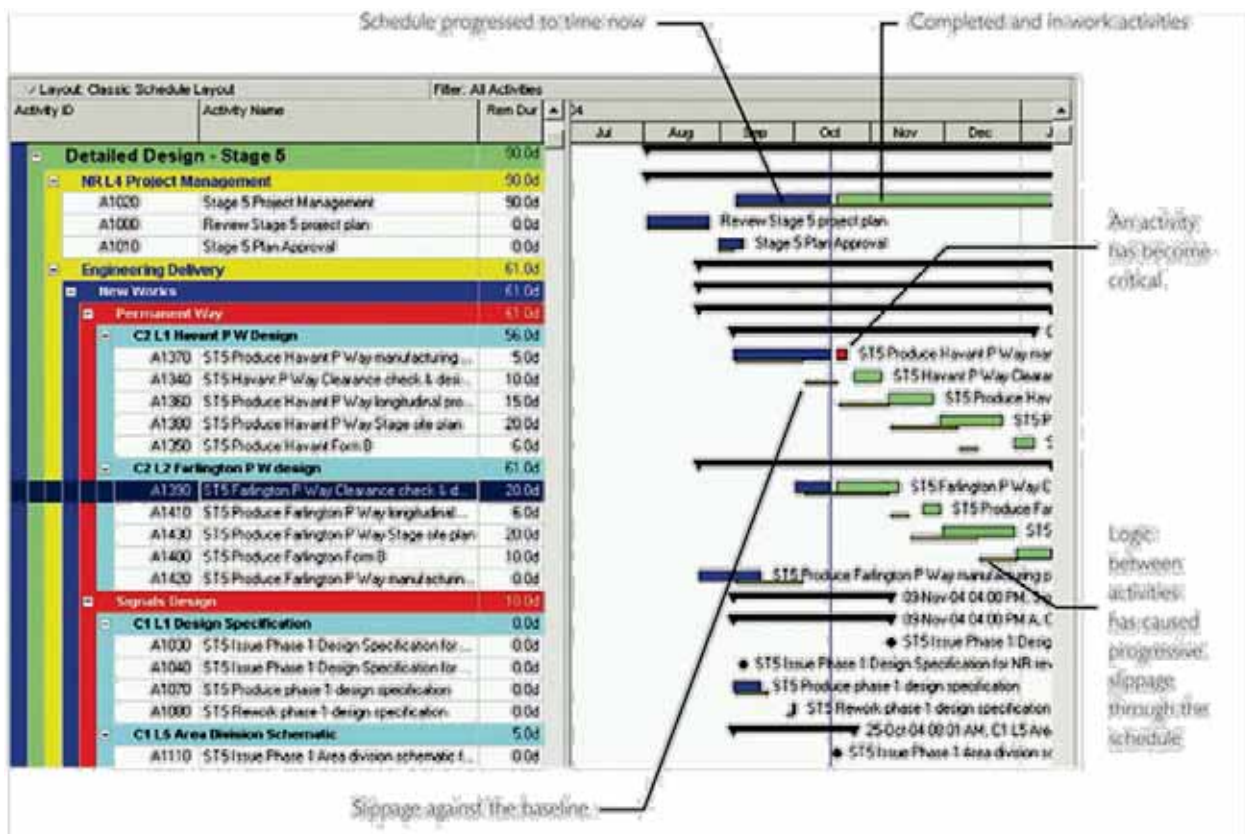
Gantt (Bar) Charts

A Gantt chart is a simple form of bar chart. Its primary characteristics are:

- a timeline showing project calendar
- the bar length indicates duration
- tasks are usually positioned at earliest start and finish dates showing any float at the end
- it is shown with or without logic connections
- the critical path is identified, typically in red
- it is the most common representation of a project schedule
- it can also show comparison of current plan to original plan (baseline)
- it can be generated using software tools
- it can be rolled up into summary tasks and can show milestones (key events, moments in time)

⁴ See also topic 'Planning (APM BoK 3.1.5)' where this is discussed in more detail.

The Gantt chart should typically be produced once the network is understood and the critical path analysis has been completed. It is important to remember when producing a Gantt chart that a Legend or Key should be added so that anyone reading it understands the different colours and shapes.



Milestones

Milestones are significant events in the project and are normally associated with the completion of a key deliverable. Milestones are represented on Gantt charts as activities with zero duration and are generally placed at the end rather than at the beginning of phases (for example once deliverables have been created) since the emphasis is on what has been completed rather than what is to be started.

Identifying the milestones is often the first step in schedule planning. It makes sense to plan at this level first, before going into too much detail (particularly on large projects).

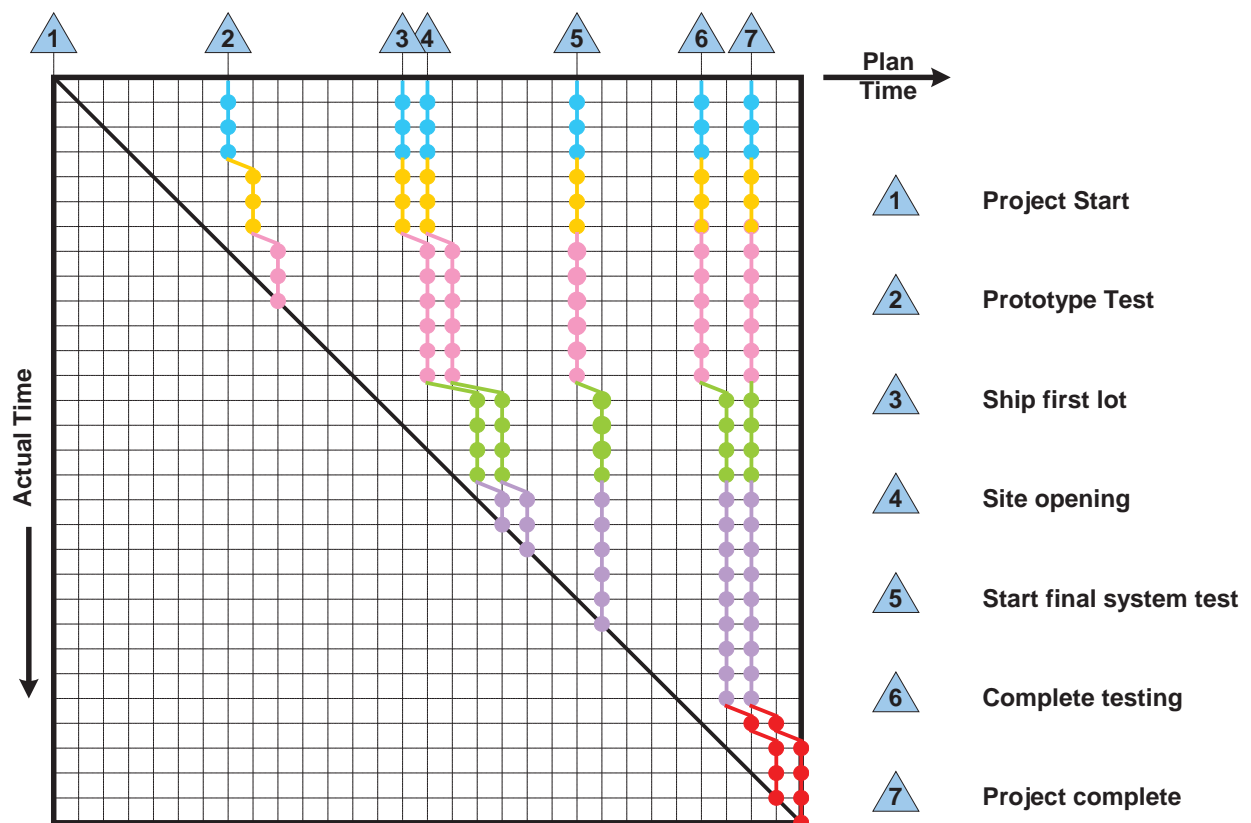
The characteristics of milestones include:

- they define key events in the project (typically completion of major deliverables, intermediate products or results)
- they can act as motivating factors for the team and/or suppliers (reward and recognition may be tied to successful achievement)
- they mark the key decision points in the project (and may be linked to a go / no-go decision)

- they are good for progress monitoring (e.g. summary table showing baseline dates against forecast or better still, graphically through the use of a milestone chart)
- they help avoid too much detail about low level activities (the focus is on what is to be achieved, not how)
- they are frequently used to trigger payments to contractors and/or from customers and are also used to trigger management approval for funding for the forthcoming phase

Milestone Chart

A Milestone Chart summarises progress towards completion of the milestones in a project. It is a very simple but effective method of showing progress to key stakeholders in a graphical and easy to understand way. They have the added advantage of being easy for the project manager to create and update and simply require the extension of a vertical line representing the forecast timing of the milestone in each reporting period. The reporting period can be weekly, fortnightly or monthly, depending on the size and duration of the project.



Project Management Software

Numerous software applications are available for scheduling projects providing distinct advantages and disadvantages to the project management team. Although these applications are often referred to as 'project management' applications, they are typically just time planning or scheduling tools. The advantages and disadvantages of using these applications can be compared as follows:

Advantages	Disadvantages
<ul style="list-style-type: none"> ▪ Allow rapid scheduling to be undertaken ▪ Fast and effective reporting capability ▪ Ability to format and store data in different ways ▪ Ability to manage large numbers of activities ▪ Ability to plan, schedule and review large, complex projects ▪ Ease of resource scheduling – levelling and smoothing ▪ Data extraction to other application formats ▪ Integration of project data with other corporate data systems ▪ Ability to consider different 'what-if' situations ▪ Enterprise project planning and management ability ▪ Ability to store multiple copies of a project for reference and audit purposes 	<ul style="list-style-type: none"> ▪ May require specialist planner to use effectively ▪ Could provide inconsistent results, depending on the application ▪ Requires investment in maintenance of the software – annually or at least on a regular basis ▪ Not always cost effective to use – this depends on the size and complexity of the project ▪ Can produce illogical results when software alone is used to make decisions (e.g. automatic levelling functions) ▪ Software can lead to less personal interaction allowing problems to be missed or misinterpreted ▪ The software may not be suitable for all project management methods (e.g. Agile) or if an iterative approach is adopted ▪ Quality of the output depends on the quality of the data input ▪ Frustration due to inexperience and unfamiliarity with the tool

Schedule Optimisation

It is common that, even after spending significant time creating a network, analysing the critical path and producing a Gantt chart, the project manager is faced with a situation where the project end date is unacceptable to certain stakeholders. Two common responses when confronted with this scenario include:

Crashing the schedule: Crashing involves adding more resource to the project. Additional funding may or may not be available for this.

Fast-tracking: This involves performing tasks in parallel that you initially planned to undertake sequentially. Project managers must carefully consider any risks associated with this course of action.

A third option to **de-scope** the project may also be considered if the above two options are deemed to be unacceptable.

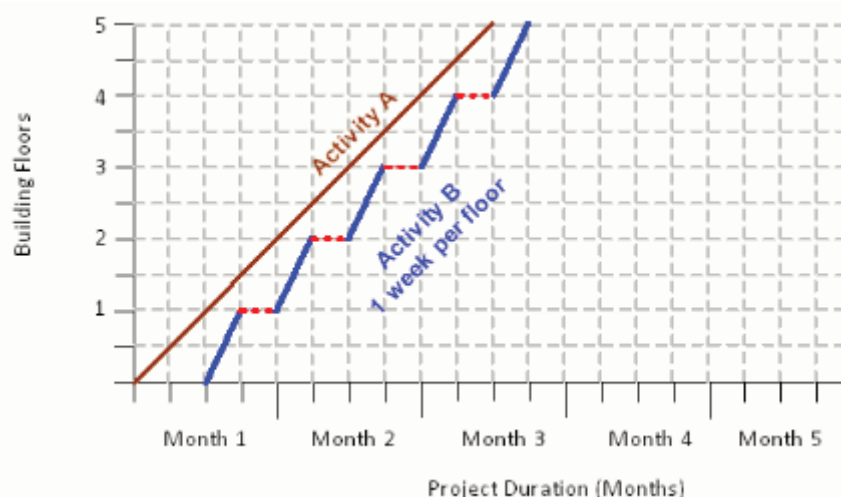
Other Time-Scheduling Methods

Network analysis as detailed thus far is not necessarily the best time scheduling method for all circumstances. A number of alternative approaches have been developed that may provide a better representation of how the work will be carried out and is better suited for more effective management.

These alternate scheduling methods include:

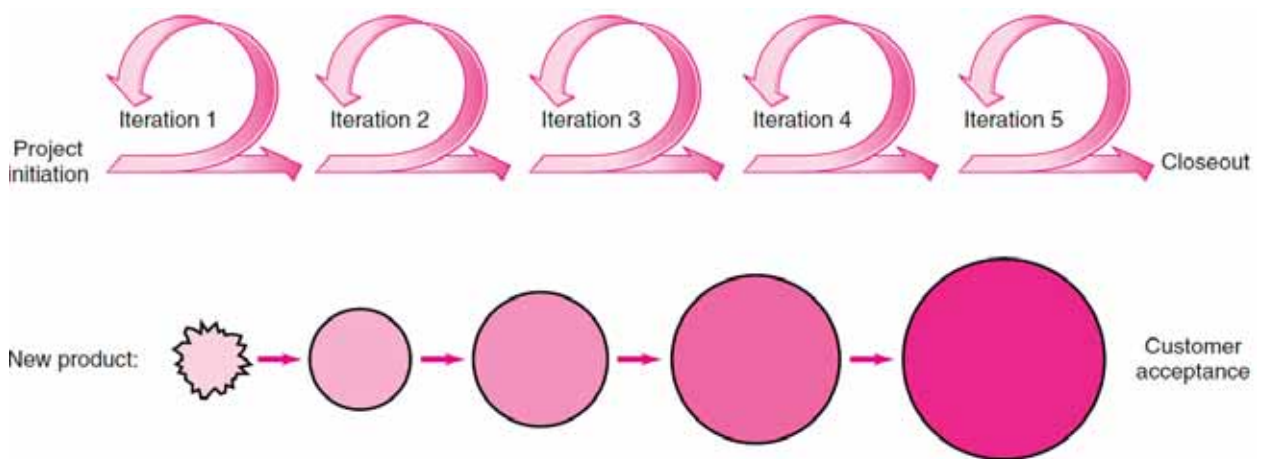
- Line-of-balance
- Time
- Time Chainage

Line of Balance – this technique is often used on projects that deliver repetitive products. For example, construction activities on a housing estate development. The technique is useful in showing how teams move from product to product rather than the detail of individual activities.

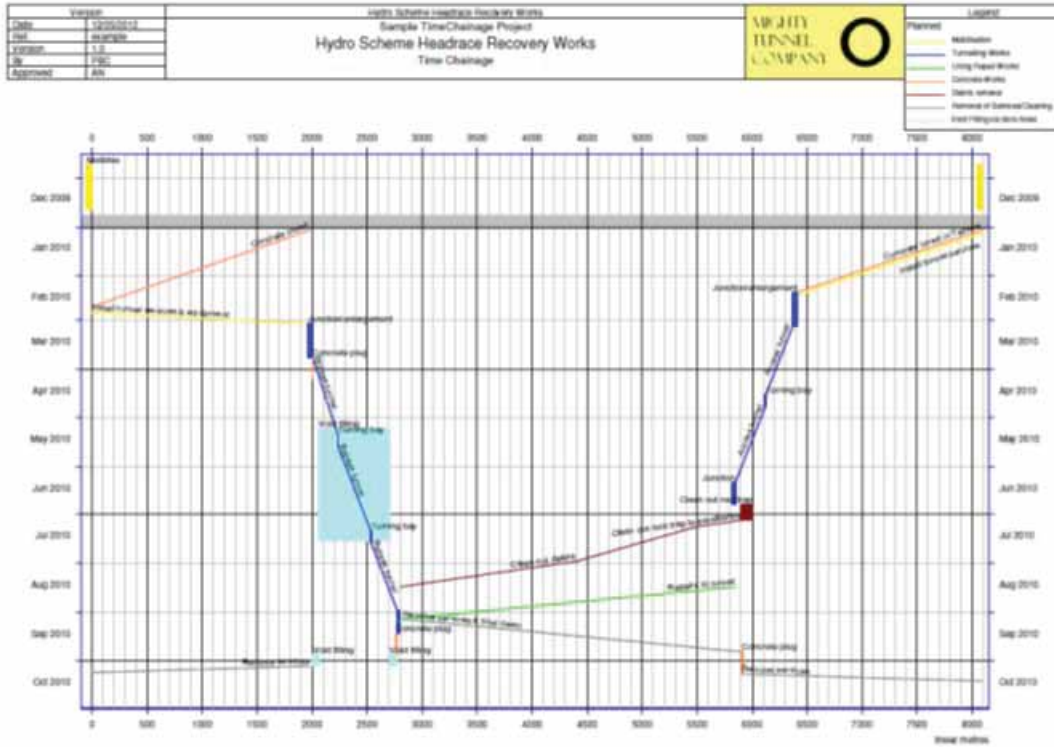


Time – this technique is used on Agile projects, typically software development projects. The project is divided into several discrete periods (time boxes) that generally have durations of between two and six weeks. The work scope and priorities are changed in order to meet the fixed timescale.

- Relies on incremental, iterative development cycles to complete less-predictable projects.
- Is ideal for exploratory projects in which requirements need to be discovered and new technology tested.
- Focuses on active collaboration between the project team and customer representatives



Time Chainage: this technique is used on linear projects such as roads, tunnels, pipelines and waterways that shows the timing of activities combined with the physical location of the work. As such it is also referred to as “time-location” scheduling.



Resource Management (APM BoK 3.7)

“Resource management comprises the acquisition and deployment of the internal and external resources required to deliver the project, programme or portfolio.”

APM BoK 6th Ed.

Resources are those elements required to be utilised to complete a piece of work and include people, machinery (plant and equipment), materials, facilities and technology. These can be sourced internally from the host organisation or procured from external sources.

As a normal part of planning, the project manager will identify the type and numbers of resource required to deliver the work and as part of scheduling will identify when the resources will be required.

When sourcing resources from an internal source, this may be subject to service level agreements or other arrangements between the project and the function providing the resource.

Where resources are sourced from an external provider, this will be achieved through a procurement process. This process will result in a contract being agreed and will involve a supplier selection process. The subsequent contract needs to be managed to ensure all parties fulfil their part of the agreement and that the project proceeds according to plan.

The contract sets out those obligations and the actions that can be taken if they are not met. Setting up the management infrastructure for resource management is called “mobilisation”. As a project is a temporary organisation, resources are mobilised and demobilised on a regular basis.

The resource management plan sets out the policies and procedures to be used for acquiring and deploying the project resources.

Smaller projects may not require in-depth expertise in formal procurement and contract management procedures, the project manager will require negotiation and influencing skills to compete for the required resources. The project sponsor will support the project manager in gaining organisational commitment to provide the required resources.

Larger projects may require support from a specialist procurement function which has the necessary expertise in provider selection and contract negotiations in order to obtain the internal and external resources to deliver the project work.

Resource Scheduling (APM BoK 3.3.1)

“Resource scheduling is a collection of techniques used to calculate the resources required to deliver the work and when they will be required.”

APM BoK 6th Ed.

Resource scheduling requires the project manager to estimate the quantity of resources required to complete the project activities, schedule when they are required and optimise their utilisation based on constraints such as target end dates for the project and the (maximum) level of resource available. The challenge for the project manager is to ensure that:

- these resources are available at the required time
- the required quantity of resources are acquired
- appropriate resources are requested

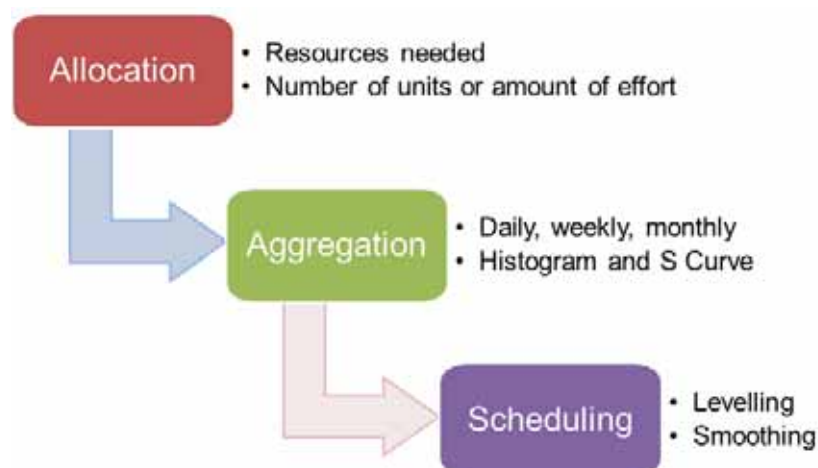
The relative priority of a project within the business will be a key factor in determining how resources are allocated across individual projects.

Types of Resources

Two types of resources can be identified as used on projects.

- **‘Replenishable’** resources include items such as raw materials and money. Once they are used up they are no longer available and fresh quantities are required
- **‘Re-usable’** resources are items such as people, plant machinery, facilities and equipment. These are available for use elsewhere once they have completed the tasks assigned to them.

The project manager will use a number of commonly used estimating techniques to determine the necessary quantity of each of the above resources. Managing these resources will then involve allocating them to the appropriate tasks, optimising their use through levelling and smoothing their utilisation, and producing a resource-loaded schedule. The resource scheduling process can be summarised as:



- **Allocation** – identify what resources and number of units of resource are required
- **Aggregation** – totalling the units of resource per time period to generate a histogram and accumulate these figures to generate an S-curve
- **Scheduling** – where resources are limited, schedule the project to optimise delivery based on resource availability

Scheduling the resources ensures:

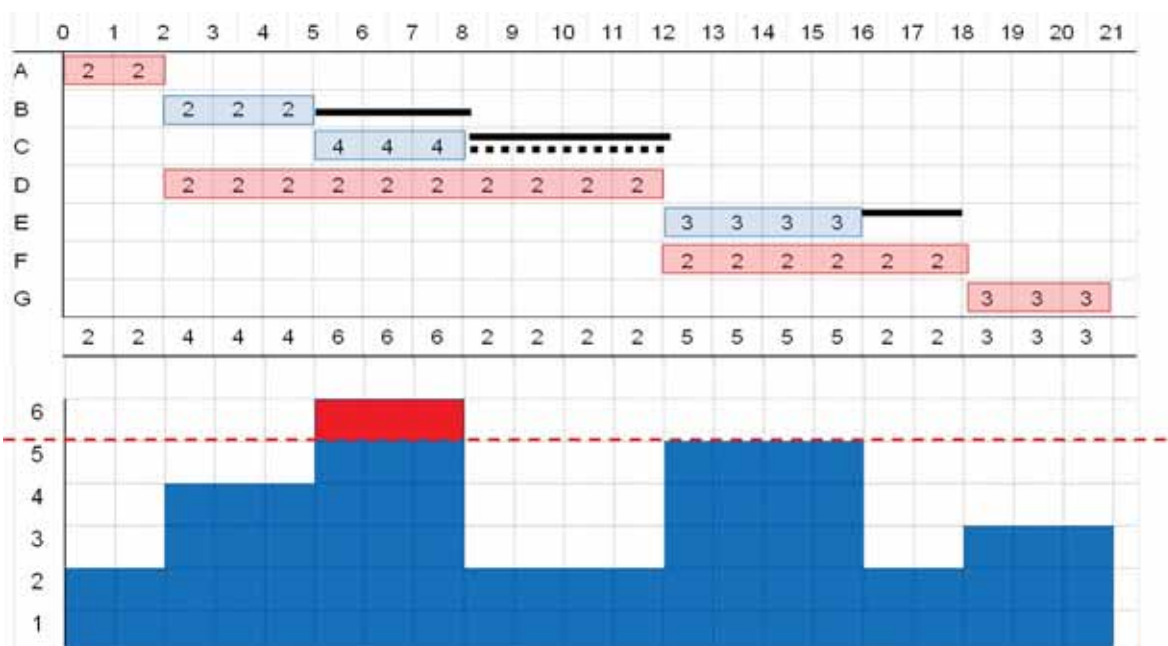
- efficient and effective resource utilisation
- confidence that the schedule is realistic
- early identification of resource capacity bottlenecks and conflicts.

Resource Scheduling: Allocation (Histograms)

Prior to carrying out critical path analysis it is necessary to estimate the effort required to complete each activity. In turn, the duration of these estimates is determined by the amount of resources to be used. The project manager has to decide the ideal number of resources although these are not always available as required.

An optimal solution will be met by iteration of the resource planning and management processes. The resource planning process may therefore amend the schedule which was developed during the schedule planning process (if the two tasks have been undertaken sequentially).

Resource utilisation can be displayed on a time-phased histogram that can show both the total number of resources used by period as well as resources per individual skill-set. One of the key features of the histogram is that resource overloads and periods of under-utilisation can easily be identified thereby allowing informed optimisation to be undertaken.



Resource Scheduling: Levelling and Smoothing

The project manager may create a schedule that can be delivered using resources at a determined rate, but that assumes that these resources will be available. Problems may exist that will prevent the schedule from being achieved; for example, the resources are unavailable (whether already assigned to other work or the schedule requires more resources than are employed) or there may be physical constraints on the number of resources that can work on the project at the same time.

Alternatively, the project manager may wish to smooth out peaks and troughs in the anticipated utilisation to ease resource allocation for the project. Inevitably, any compromise solution is a trade-off between Time, Cost and Quality.

- **Resource-limited Scheduling – Levelling:** Levelling involves scheduling the activities such that a defined resource limit is not exceeded. This resource limit may be imposed by the priority of the project within the business or the availability of key skilled staff. Resources are subject to a fixed limit which will affect the sequence and / or the duration of activities. Levelling may ultimately delay the project to keep within the resource limits. Activities with positive total float are re-arranged first.
- **Time-limited Scheduling – Smoothing:** Smoothing is used when the end date is fixed and resources are to be expended to meet that end date. Duration is paramount but you still need to achieve best use of resources. Activities are rescheduled within their available total float to achieve a profile which is as smooth as possible.

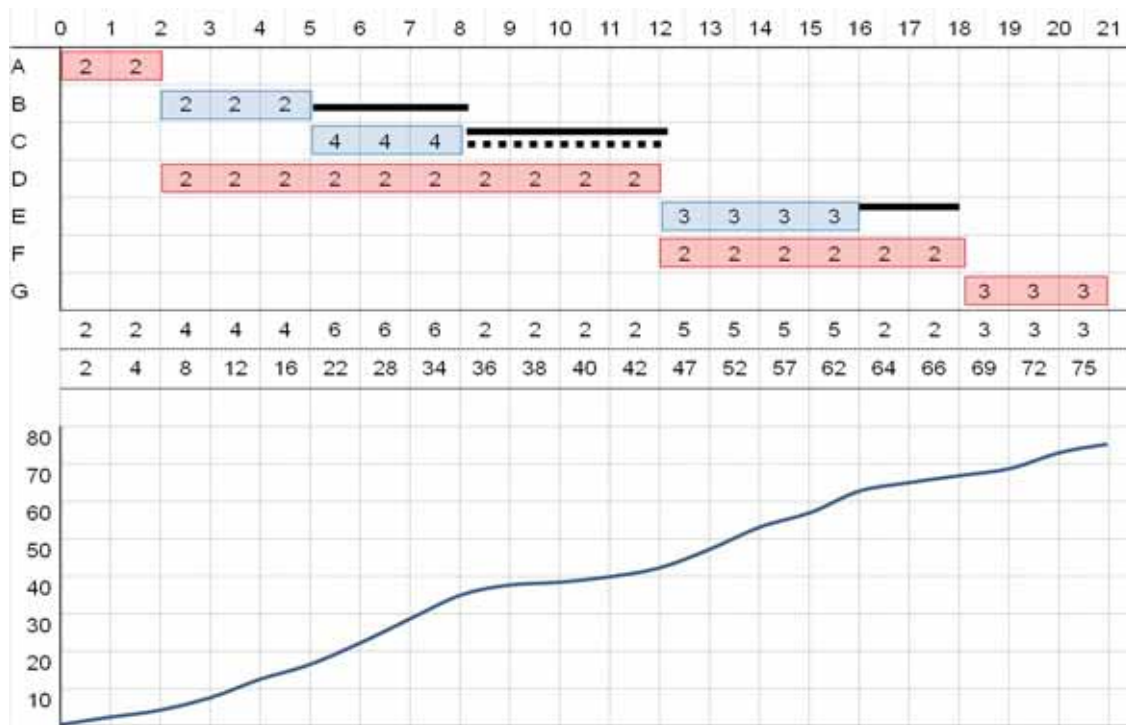
Typical options for rearranging activities are:

- delay an activity within its float to a period when resources are available
- stretch an activity by using resources at a lower rate
- compress an activity by using resources at a higher rate
- alter the profile of resource usage across the duration of the activity
- split an activity so that the resulting smaller activities can make use of pockets of resource availability
- alter the logic of the network to allow activities to start earlier
- recruit more resource
- provide training to develop multi-skilled resource
- employ alternative (less labour intensive) working methods
- work overtime
- modify the calendar work periods – change from a five-day week to a six-day week, or extend the shift length from eight hours to 10 hours per shift.

Resource Scheduling - 'S' Curve

The final stage in the resource management process is to take the total resource units for each time period and create a set of cumulative figures for each time period on the calendar. This will create a spend profile for the project resources.

The spend profile is an important basis for control techniques that compare planned effort against actual effort. This can be used during Earned Value analysis.



Use of Software Tools for Resource Management

Many software scheduling packages offer facilities for scheduling resources. The pros and cons of these packages are similar to those when scheduling a project.

However, a further note of caution is justified when considering resource allocation and scheduling. Rescheduling resources is essentially an iterative process. When using planning software to reschedule resources, the software assumes various heuristics that may not be immediately understandable to the project team and can subsequently cause considerable confusion. As flawed as computer software may be, it is difficult to accomplish effective optimisation manually on projects that require the modelling of numerous resources.

Budgeting and Cost Control (APM BoK 3.4.1)

“Budgeting and cost control comprise the estimation of costs, the setting of an agreed budget and management of actual and forecast costs against that budget.”

APM BoK 6th Ed.

Budgeting and cost control includes planning, estimating, budgeting, evaluating, monitoring, forecasting, reporting and controlling processes. It supports decision-making in relation to the evaluation of the benefits, costs and risks in the business case for the project. It also works alongside other control processes such as schedule control, change control and risk management since these processes are interrelated.

Project Budget

A budget identifies the planned expenditure for a project and is used as a baseline against which the actual expenditure and predicted eventual cost of the work can be reported.

Initially, cost estimates can be provided using the comparative or parametric estimating technique. These are refined as the feasibility of the project is investigated and a greater understanding of the scope, schedule and resources is developed.

Detailed costs for the project will be derived through bottom-up estimating based on a well-defined scope and WBS developed to an appropriate work package level.

When approval for the project to proceed is obtained, the refined estimates form the baseline cost and when allocated to schedule activities, a profile of expenditure is obtained.

The three major components in that make up the project budget are:

- the base cost estimate
- contingency
- management reserve

Base cost estimate

The base cost estimate comprises known costs associated with:

- resourcing – this includes staff costs, consultancy fees etc.
- accommodation and facilities
- consumables – e.g. power, stationery, IT supplies etc.
- expenses – travel and subsistence, communication
- capital items

When considering the base cost estimate and the elements this comprises, it is possible to identify two main categories, each of which may comprise elements of two sub-categories:

Main categories include:

- **Direct costs** - these are costs exclusive to the project and include the costs of resources directly involved in delivering and managing the work
- **Indirect costs** - these costs include the costs incurred by the project but which cannot be directly associated with a specific work element. These include overheads and other charges that may be shared across multiple activities

Sub-categories include:

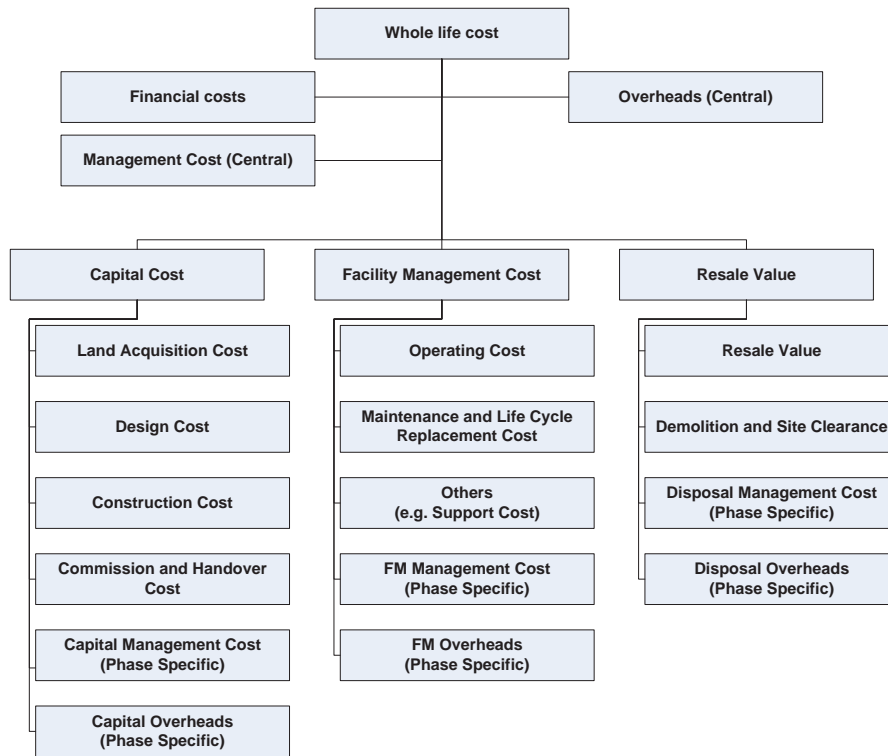
- **Fixed costs** - these are costs that remain the same regardless of how much output is achieved. Examples include the purchase of plant or machinery.
- **Variable costs** - these are costs that fluctuate depending on the amount of resource being used and include salaries, materials etc.

Budget / Cost Alignment

The work breakdown structure (WBS) is a useful tool for effective cost control and enables project costs to be controlled at appropriate levels, providing visibility and enhanced understanding. Each work package in the WBS will have costs associated with labour, materials, expenses and possibly other cost categories as indicated above.

A cost breakdown structure (CBS) can be used to ensure that costs can be hierarchically attributed to a specific work package as well as being aggregated to align with the financial reporting systems of the host organisation.

This will provide increased visibility for the finance group in order to monitor costs and identify trends in expenditure.



Contingency

Contingency is defined as: *“the money set aside for responding to identified risks.”*

APM BoK 6th Ed.

This part of the budget is set aside for responding to the risks after accounting for the cost of avoiding, transferring and reducing the threats or exploiting, enhancing or sharing the opportunities.

Management Reserve

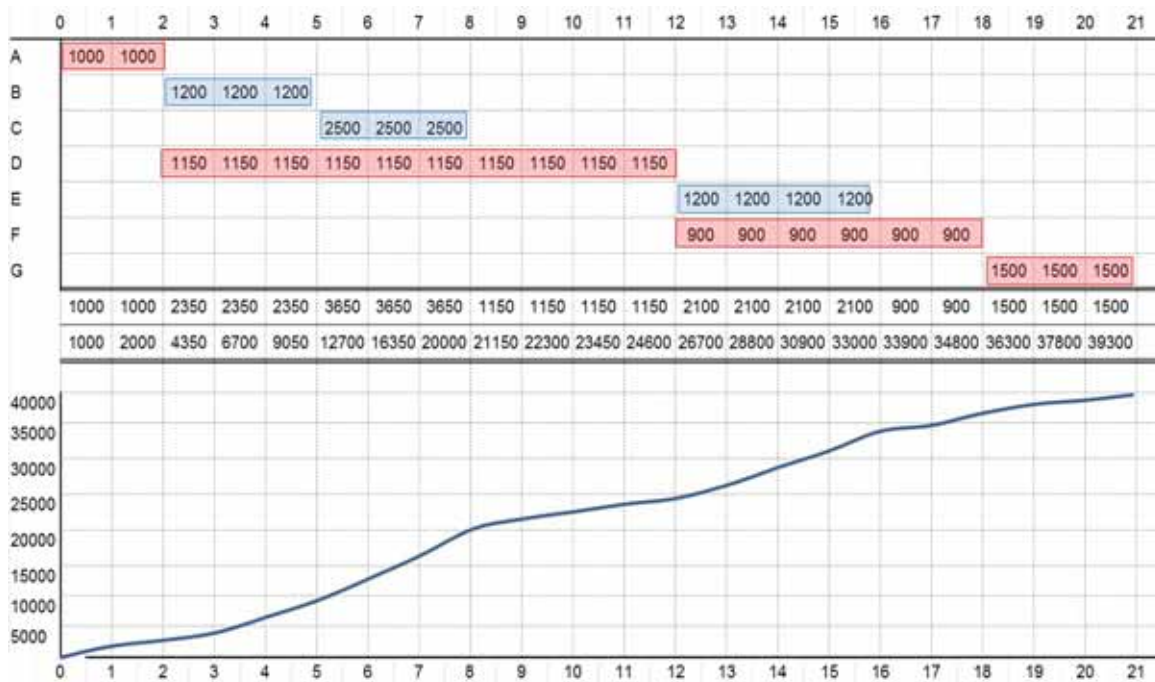
Management reserve is defined as: *“a sum of money held as an overall contingency to cover the cost impact of some unexpected event.”*

APM BoK 6th Ed.

These unexpected events include changes to the scope of work or unidentified risks. The greater the uncertainty on the project, the greater the management reserve required. Innovative work will require a larger management reserve than routine work.

Expenditure Profile

Once the cost estimate, contingency and reserve have been agreed with the sponsor, these form the total allocated budget for the project. These can be shown in graphical form as a cumulative spend curve, or ‘S-curve’.



The creation of the spend profile allows a cash flow forecast to be developed and a drawdown of funds to be agreed.

The project manager will generally have control over the base cost, while the sponsor retains control over the contingency and management reserve. These may be held centrally as part of broader organisational funds.

Once the project gets underway, actual and forecast expenditures are regularly monitored. The baseline cost derived for the project forms the basis for performance measurement and monitoring using earned value management techniques (EVM).

Cost Types

There are typically four types of costs that are incurred on a project:

- **Committed Costs:** This is money set aside for future provision of goods or services; that is, where a placement for an order for work to be done or materials required has been made, but the work is yet to be started or goods received. This money is often removed from the budget as the organisation has an obligation to pay these costs
- **Accruals:** Work that is partially or fully completed for which payment will be due; that is work that has been undertaken for which the project has not yet paid, or been invoiced but is obliged to account for

- **Actual Costs:** money that has been paid out of the budget for services rendered or materials purchased
- **Forecast Out-turn Cost:** simply the total of committed costs, accruals and actual costs plus the estimate of the costs remaining in the work packages required to complete the project.

Organisations must accurately monitor and control each of the above costs if the project is to be delivered within the agreed success criteria. This will involve the creation of appropriate mechanisms for the capture and reporting of project costs and expenditure.

Actual expenditure invariably varies from the planned expenditure. In the light of this there should be agreed tolerances within which the project manager will operate.

Where the agreed tolerances is breached, the sponsor will need to become involved – this will form the basis of a project issue.

The project viability will be periodically reviewed on a formal basis – typically at a stage gate – this will lead the sponsor and project manager to consider ‘sunk costs’.

Sunk costs are defined as: *costs that are unavoidable, even if the remaining work is terminated.*”

APM BoK 6th Ed.

Sunk costs are essentially the actual, committed and accrued costs that cannot be recovered, plus any costs incurred due to early termination of the project.

Cost Management

The essence of effective budgetary control is two-fold:

- **Cost-accounting:** Monitoring and control to compare actual costs with planned costs and the reasons for any variance
- **Cost-management:** Forecasting expected expenditure and taking appropriate corrective action to remain “on budget”. Regular reviews of progress against plan and forecast updates are essential if corrective action is to be taken on a timely basis.

The information required for effective cost management will include:

- the budget (estimates), generally represented as an S-curve and used for comparing budgeted and actual costs against progress
- the details of committed costs including their expected timing
- the measurement of work accomplished
- cash-flow (details of expected expenditure and income over the life cycle of the project)
- forecast out-turn costs
- variance analysis
- cost reporting mechanisms may range from a simple spread-sheet to graphical reports that might be automatically generated by enterprise planning tools.

Budgeting and Cost Management Benefits

The benefits of project budgeting and cost management include:

Benefit	Description
Better visibility of project cash-flow	Understanding when payments are due to be made and assessing the available funding is essential in projects. Funding may be reliant on income generating activities. Effective cash-flow management is especially important for smaller contractors and also for larger organisations who may be engaged in major projects.
Improved financial planning	Organisations need an accurate understanding of project costs if they are to make informed decisions regarding their financial commitments. This will have a large impact on the organisation's borrowing and procurement commitments and may also be heavily influenced by its financial year planning.
Understanding impact on profit and loss	Project cost commitments will have a major impact on the organisation's 'profit-and-loss' statement. The cumulative cash-flow figures will be reflected in this statement and therefore an accurate depiction of accruals, commitments and forecasts are necessary.
Establishing appropriate payment terms (customer-supplier)	It is in the project manager's interest to try and ensure that customers pay as early as possible with the reverse being true when dealing with suppliers (whilst still maintaining an ethical procurement approach). Payment terms will have a major impact on cash-flow with negative cash-flow periods being of specific concern.
Analysing the impact of budgetary change (or contract termination)	Early analysis of proposed changes that will have an impact on the project budget is important if costs are to be managed appropriately. Budgetary increases may render the project commercially unviable. The project manager must understand any contractual implications if agreements with suppliers and/or customers are to be prematurely terminated.

Benefit	Description
Informed decision-making	The project management team are much better placed to make decisions concerning the project finances if they have accurate and timely data available to them. This may involve the approval of corrective action and may also help prevent further funds being expended on a project that is no longer able to satisfy its success criteria and/or deliver the expected benefits.

Control (APM BoK 3.1.2)

“Control comprises tracking performance against agreed plans and taking the corrective action required to meet defined objectives.”

APM BoK 6th Ed.

Delivery is concerned with the delivery of outputs, outcomes and benefits. Six fundamental components of delivery need to be controlled. These six components are:

- **Scope:** what are the objectives and scope of work?
- **Schedule:** how long will it take to achieve, what are the milestones and are there any constrained dates?
- **Finance:** how are the necessary funds to be acquired and the costs managed?
- **Risk:** what are the threats and opportunities to successful project delivery?
- **Quality:** how will fitness for purpose of the deliverables and management processes be assured?
- **Resource:** how will the necessary resources be acquired, mobilised and managed?

Some techniques such as change control and quality control are specific to one of the elements, where others, such as earned value management bring together multiple elements. All techniques however, fall broadly into three categories according to Meredith and Mantel:

- **Cybernetic control** (from ‘Cyber’ the Greek for ‘Helmsman’)
 - Cybernetic systems (like the plotting of ratios) constantly monitor the project and are your eyes and ears. It is up to you to use that information to steer the project.
- **Go / no go control**
 - Go/No go points need to be built into the project, which is why many projects are divided into phases and stages. The end of each stage gives an opportunity to continue or cut your losses and stop the project.
- **Post-control**
 - A post project review will not help with the current project but lessons learnt from experience will help improve the project management process in the long term.

The simplest analogy for these would be a motorway journey by car

- **Cybernetic:** whilst you are at the wheel of your car on the road, you are constantly adjusting speed and direction. This may involve slowing down, changing lanes, steering and a host of other minor adjustments. Your eyes and ears are monitoring your progress and your brain makes decisions based on the information received compared with stored information about speed limits, the controls of your car and your objective (i.e. reaching your destination safely).

- **Go/No go:** each time you reach a junction on the motorway you have the option to turn around and go home. Maybe the weather is getting too bad to travel safely. Perhaps you heard on the radio that the motorway is closed further along. Possibly you are running so late you will miss your meeting and there is no point going on. At each junction you have the choice: keep going or go home.

- **Post:** having arrived safely, someone may ask “How was the journey?” Maybe the route you chose was ideal and you will definitely come that way again. If it was full of road-works you make a note to find an alternative. It’s too late to do anything about the journey you have just completed, but you are already thinking about the next time.

On a project, the baselines for control will be the business case and the project management plan (PMP). These are concerned with what the project must deliver and how it should be delivered. Control methods must be appropriate to the scale, context and complexity of the project being undertaken.

On small, simple projects the Gantt chart along with a milestone chart may be sufficient. On more complex projects with a well-defined scope perhaps earned value management (EVM) may be required.

EVM is a project-control process based on a structured approach to planning, cost collection and performance measurement. Essentially EVM integrates project scope, time and cost objectives to establish a planned schedule and budget baseline. This provides the means for comparing the actual value of work completed against this baseline.

Standard scheduling, budgeting and cost management will inform the project manager and other stakeholders what budget has been spent and what activities have been completed or progress achieved.

On projects where time is of the essence and the scope is flexible, the Agile approach is becoming increasingly popular. In this approach, control of time is achieved through ‘time boxing’ and the emphasis is on change control of scope. The MoSCoW technique is used to prioritise the requirements within each ‘time box’.

Very few projects are delivered strictly according to plan. Effective planning contains provision for contingency and management reserve that will help cushion the effect of issues. It must be noted that the control of these resides with either the project manager or the project sponsor and this level of control must be agreed early on in the project.

Where the progress on a project is affected by external influences outside the control of the project manager, the project sponsor must provide active support to the project. Effective project control is heavily reliant on the relationship between the project manager and the project sponsor.

The control categories mentioned earlier in this text can be further expanded as follows:

Category	Description
<p>Cybernetic control</p>	<p>This technique is concerned with routine progress tracking and corrective action – the central role of the project manager.</p> <p>Project control can be defined as the ability to identify deviations from a plan or baseline and take appropriate corrective action to get back on track.</p> <p>Four vital elements need to be present:</p> <ul style="list-style-type: none"> ▪ an accurate agreed baseline ▪ a means of measuring actual work ▪ the means of identifying variances from the baseline ▪ appropriate corrective actions must be implemented <p>For the project manager to be able to deliver the project according to the agreed baseline – a core responsibility of the project manager – the project manager must have agreed tolerances within which the work can be managed.</p> <p>Tolerances are acceptable deviations from the baseline. Where performance is outside or predicted to be outside of these agreed tolerances, the project manager must escalate this as an issue to the project sponsor. Traffic light (RAG) reporting is a valuable tool in this respect.</p>

Category	Description
Go / no go control	<p>This control category is concerned with the key decision points built into the project life cycle. Typically these will be at the end of a stage and involve a major review of what has been delivered.</p> <p>The output from the project to date and the creation of the capability or changed environment from which benefits are to be realised is assessed. The sponsor considers the continued viability of the project against the business case. In extreme cases the project may be terminated as it will no longer create the environment or capability for benefits to be realised.</p>
Post-control	<p>This control technique reviews the past – it is backward-looking and concerned with learning from experience. This is typically achieved through post-stage or post-project reviews.</p> <p>The level of organisational maturity are dependent upon the ability to identify and act upon lessons identified.</p>

Control techniques can be seen as either **event-driven** or **time-driven**.

Go / no go and post-control techniques are event-driven in that they are triggered by the end of a stage or end of the project. An important event-driven control is one that is triggered by progress that exceeds agreed tolerances.

Time-driven techniques are more applicable to cybernetic control and involve regular periodic reporting. Reporting is done weekly, monthly or quarterly as an example. The project manager collects the relevant progress data and prepares the required reports showing performance and highlighting the areas where attention is needed. This could be an activity undertaken by a support function, freeing the project manager to concentrate on effective decision-making and implementing appropriate corrective action.

Earned Value Management

“Earned value management (EVM) is a project control process based on a structured approach to planning, cost collection and performance measurement. It facilitates the integration of project scope, time and cost objectives and the establishment of a baseline plan for performance measurement.”

APM BoK 6th Ed.

EVM is one of the most commonly used performance measurement methods within project management. The fundamental principle behind EVM is that it integrates scope, time and cost measures in order to help assess current progress and forecast an outcome based on current performance. EVM also allows informed decisions to be taken regarding identification of issues and any required corrective actions.

Why Do We Need Earned Value

Most organisations already have methods in place to measure actual expenditure against planned expenditure. This analysis only provides part of the story. EVM adds a third dimension, the value of work performed to date (i.e. Earned Value). Another way to think of Earned Value is "useful work done"

EVM Requirements

Before EVM can be effectively applied to projects, a few fundamental elements need to be in place first; these include:

- **Work Breakdown Structure / Organisation Breakdown Structures:** The WBS and OBS define the work to be done on the project and who will do it
- **Baseline Plan / Budget:** The time-phased budget for the project will provide the primary baseline against which progress and expenditure will be measured (this is often known as the PMB - Performance Measurement Baseline)
- **Status Updates:** Performance data relating to project costs and progress must be accurate and provided in a timely fashion
- **Forecasts:** Estimates of the remaining work and expenditure also need to be provided
- **Change Control Process:** A well-defined baseline will provide a firm basis for assessing the impact of changes to the agreed scope, time and cost baselines and whether any change will result in updates to the baseline

The success of EVM relies on both the accuracy of the baseline input and the accuracy of the progress measurement data provided.

EVM: Present Status

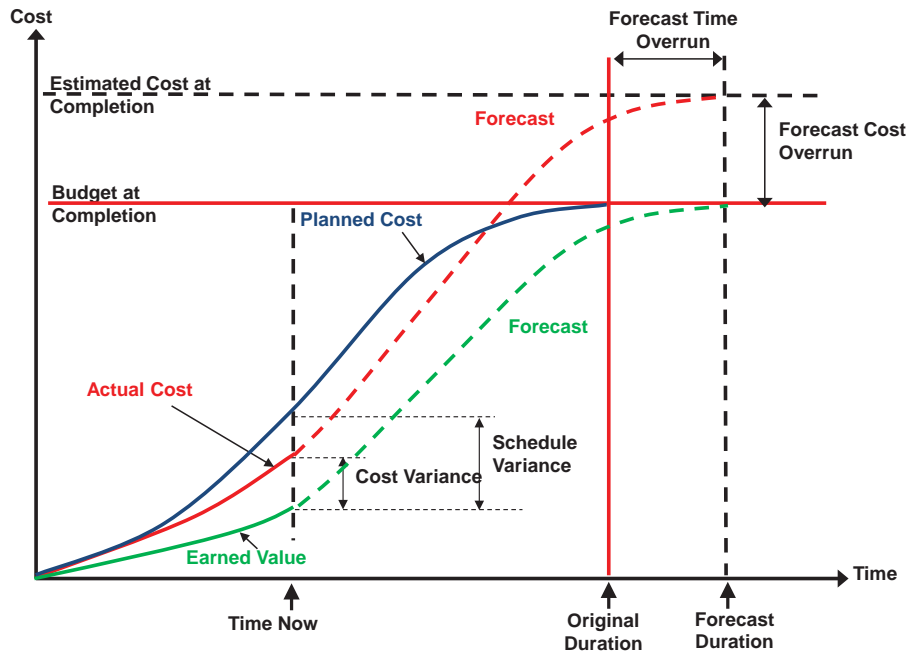
As stated, the purpose of Earned Value Management is to provide information regarding the present status of the project and forecast future performance. The Earned Value is compared against the Actual Cost (AC) and the Planned Cost (PC) at a given point in time. This can provide insight into four key questions:

- How does the useful work done (EV) compare against the Actual Cost (AC)?
- Has the effort required to achieve this work cost more or less than planned? (CV – Cost Variance)?
- How efficiently is the budget, whether money or effort, being managed (CPI – Cost Performance Index)?
- How does the useful work done (EV) compare against the Planned Cost (PC) of work at this point in the project?
- Is the project ahead or behind the planned schedule at this present point in time? (SV – Schedule Variance)?
- How efficiently is the time being managed (SPI – Schedule Performance Index)?

Forecasting Future Performance

In addition to assessing the current health of the project, EVM also provides very useful indicators of its likely future health:

- ongoing performance of the project based on present performance
- eventual cost and schedule variance as well as likely performance trends
- measures of cost and schedule efficiency (CPI and SPI)
- final outturn cost (Estimate at Complete – cost: EAC)
- final duration of the project (Estimated Final Duration: ETC)
- what type of corrective action is required to improve or rectify project performance



Earned Value Calculations

EVM monitors and develops the key dimensions discussed in order to provide a quantitative assessment of the present project status and its likely future performance.

Four components are identified either in planning or through monitoring and control:

Measure	Initialism	When determined	Comment
Budget at Completion	BAC	Planning	The sum total of the time-phased budgets for the project (i.e. the total Planned Cost). Performance Measurement Baseline (PMB)
Planned Duration	PD	Planning	Estimated final duration of the project
Planned Cost	PC	Planning	Planned cost of work that should have been achieved at a specific point in time. Also known as: PV – Planned Value BCWS – Budgeted Cost of Work Scheduled

Measure	Initialism	When determined	Comment
Actual Cost	AC	During Implementation	Cumulative cost of work accrued on the project so far. Also known as: ACWP – Actual Cost of Work Performed

The calculations used to determine the current situation in the project and forecast performance based on what is happening now are:

Measure	Initialism	Calculation	Comment
Earned Value	EV	$EV = \% \text{ Complete} \times \text{Budget}$	Value of work performed expressed in terms of budget assigned to that work. Also known as: BCWP – Budgeted Cost of Work Performed
Cost Variance	CV	$CV = EV - AC$	Difference between the value of the work performed and the actual costs incurred. A negative number indicates poor performance whereas a positive number indicates favourable performance.
Schedule Variance	SV	$SV = EV - PC$	Difference between the value of the work performed and the planned cost of the work that should have been performed at this point in time. A negative number indicates poor performance whereas a positive number indicates favourable performance.
Cost Performance Index	CPI	$CPI = EV / AC$	Cost efficiency ratio that measures work accomplished against costs incurred at a specific point in time. Number above 1 indicates favourable performance; below 1 indicates poor performance.

Measure	Initialism	Calculation	Comment
Schedule Performance Index	SPI	$SPI = EV / PC$	Schedule efficiency ratio that measures work accomplished against work planned at a specific point in time. Number above 1 indicates favourable performance; below indicates poor performance.
Estimate at Completion (Cost)	EAC _c	$EAC_c = BAC / CPI$	Projected final cost for the project (also known as the projected outturn cost)
Estimated Final Duration	FD (also known as ETC or EAC _T)	$FD = PD / SPI$	Projected final duration for the project

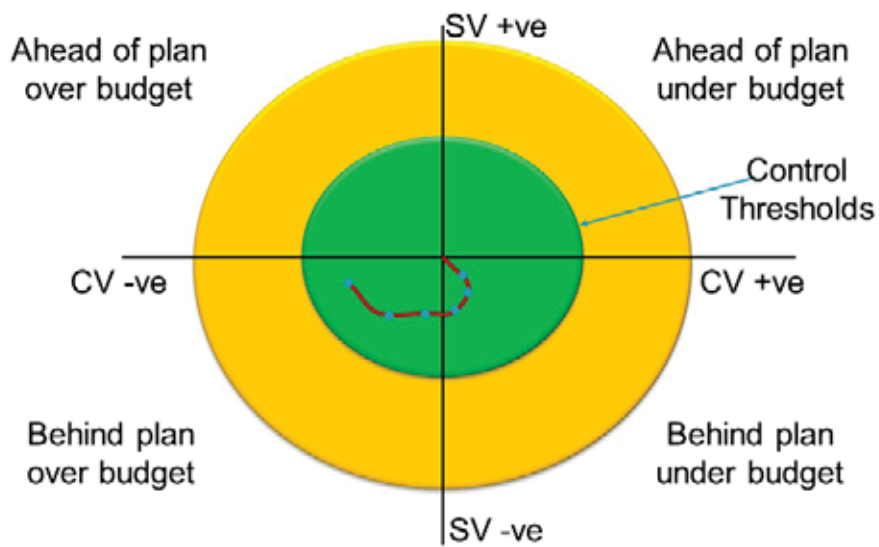
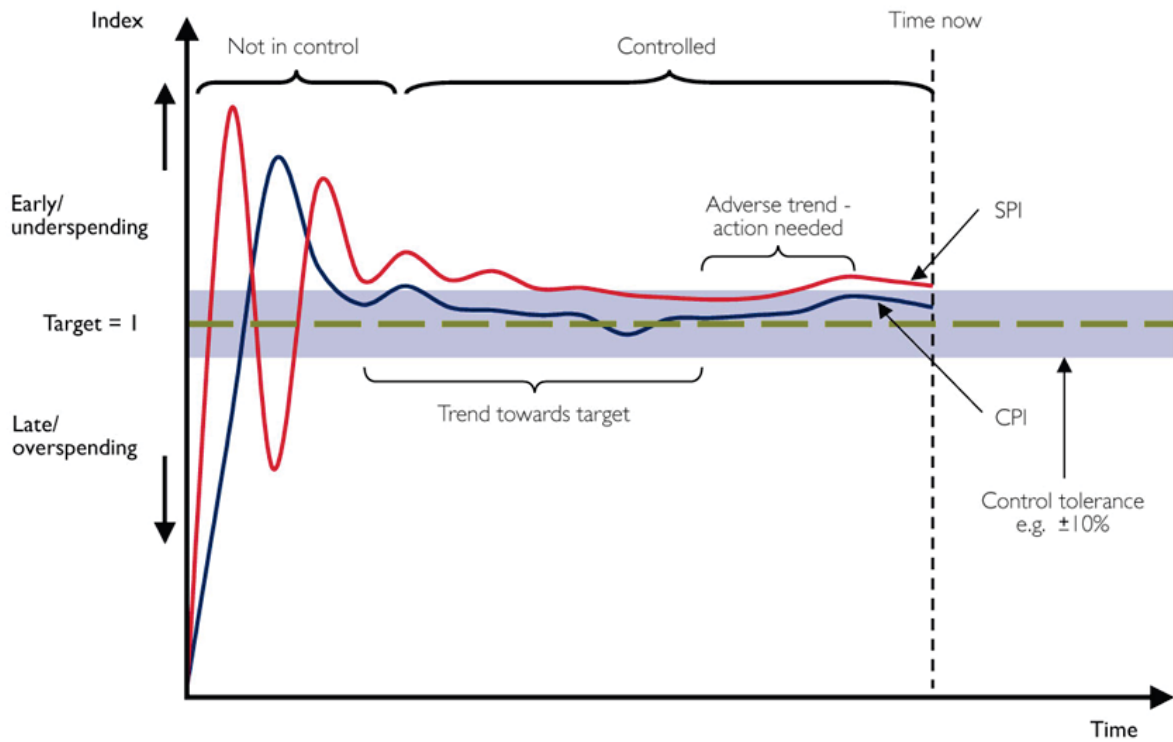
Note that we have only discussed the basic equations for EVM where it has been assumed that past performance is indeed a valid indicator of future performance. Other formulae exist for alternative situations within the project at any given point in time.

The graphical format shown in the accompanying slide-set is also based on this assumption.

Earned Value Reporting

One of the primary advantages of EVM is its simplicity of reporting. This in turn lends itself to a number of graphical formats being used to provide management with easily understandable information that can indicate present and/or future project health as well as developing trends.

Two of the more commonly used methods of graphical EVM reporting are Control Charts and 'Bull's-eye' Charts. Both of these methods can be used for reporting variances or the performance indices. It is very easy to implement a 'management by exception' method of reporting through the use of control tolerances (thresholds).



EVM Benefits

Using EVM, the project manager and other key stakeholders can readily assess the current and potential future state of the project.

There are many benefits to earned value management, which include:

Benefit	Description
Project reporting (KPIs)	CPI and SPI are two of the most commonly used key performance indicators in project management. They provide a quick and easy to understand indicator of project health. Graphical reporting formats are also easy to create and understand. (Note that incentives may also be based on these indicators; for example, supplier payments).
Highlights estimating error	EVM measures can be a very useful indicator of poor estimating (either over-optimism or pessimism). This can lead to the identification of key lessons for the organisation's estimating and/or business development processes.
Facilitates forecasting of outturn cost and time	CPI and SPI can be used to project the final cost and duration of the project. Although these projections are built on the assumption that future performance will continue as per past performance, they can be used to validate any competing assumptions and/or assertions.
Helps justify corrective action	EVM projections can act as a useful catalyst for the identification and approval of corrective action. EVM information may be used to justify a wealth of actions such as adding resources to the project, changing the team, revising the project scope etc.
May indicate early termination of project is required	When EVM projects that the outturn cost and time for the project render the Business Case to be no longer viable, this can lead senior management to prematurely close the project. Resources and funding can then be diverted to a more productive proposal.

EVM is not without its critics. Arguments against its use include:

- EVM does not take account of the critical path for the project timeline
- SPI does not work once the project has passed its planned end date (note: research Earned Schedule for a method that redresses this issue)
- too much emphasis on cost and schedule can lead to a lack of focus on quality

- the need for a well-defined initial baseline does not lend itself to project methods such as 'Agile'
- it is overly simplistic and can lead to ill-informed decisions
- as Earned Value is typically based on project progress based on individual work package percentage-complete, resultant projections are likely to be based on highly subjective assumptions.

10. Project contexts and environments

Coverage of Learning Outcomes:

- Supplier relationships
- Contracts
- Supplier selection.



Contract (APM BoK 3.7.1)

“A contract is an agreement made between two or more parties that creates legally binding obligations between them. The contract sets out those obligations and the actions that can be taken if they are not met.”

APM BoK 6th Ed.

Contracts are covered by contract law and the legal implications of any proposed contract needs to be fully understood – this may require the project manager to seek specialist advice.

A contract is required where the resource management plan requires goods or services to be sourced from outside the host organisation. The resource management plan sets out the high level requirements the contract needs to implement – for example, the sharing of risk.

While the law governing a contract will depend on where the contract is being executed, there are general principles that are universal in application. The contract is subject to principles in that there must be:

- an ‘offer’ made by one party which is ‘accepted’ unqualified by the other party
- an intention to create legal relations between the parties and for the parties to be bound by these obligations
- a consideration passing from one party to the other in return for the provision of goods or services covered by the contract
- definite terms, so that it is clear as to what conditions the parties are agreeing
- legality, with only properly incorporated firms or competent persons entering into the contracts.

A range of standard forms of contract is available for industries. Examples include Joint Contracts Tribunal (JCT) and New Engineering Contract (NEC). These are typically used in engineering and construction projects.

While standard forms of contract generally take into account established best practice within a sector or industry, a major weakness may be that it does not fully address all areas within the resource management plan for the project.

Where alterations are made to a standard contract, it then becomes a bespoke contract. That is, the contract is drafted to suit the specific procurement circumstances prevailing. While this will suit local requirements, there is a cost and time factor to be considered in producing the contract.

Contractual Relationships

Various types of contract exist and these should be aligned to the objectives and context of each individual project.

Type	Description
Comprehensive	This approach is sometimes known as a 'turnkey' contract where one party assumes responsibility for everything involved in the development and implementation of a specific solution. The assumption is typically that a single supplier has direct access to all the resources required to undertake the project.
Sequential	The sequential use of two or more contractors during a project. This approach is often used when a project is too complex to be covered by a fully defined contract at the outset of the project. The customer must understand the risk involved in this approach as it is not possible to define the overall project cost before engagement begins.
Parallel	The customer manages the relationships between all the various specialist suppliers. This allows the customer to have more control of performance and/or cost but can involve significant management of the interfaces.
Sub-contract	Suppliers may employ several sub-contractors, particularly where the project requires the input of specialised goods and services. These can be 'Back to Back' and / or conditional. Although the 'prime-supplier' takes responsibility for management of the interfaces, the customer should ensure that quality is maintained on out-sourced work packages.
Partner / Alliance	The customer and the supplier work together to manage their contract and plan to avoid and control problems and risks. The strengths and weaknesses of this approach are very similar to those associated with 'Pain-share / Gain-share' payment terms.

The contract should contain enough information for the intentions of the parties to be clear. These intentions are set out in the 'contract terms and conditions' and include items such as:

- **General information:** who the parties are, description and location of the works or services, the legal system that the contracts will use etc.
- **Responsibilities:** the provider's responsibilities for design, approvals, assignment of such responsibilities, sub-contracting
- **Time:** schedule, milestones, completion date(s)
- **Quality:** testing and defect rectification
- **Payment:** certificates, release of monies
- **Alterations:** Compensation events, change requests and dealing with unforeseen circumstances
- **Property:** who owns what during the course of the contract, transfer of intellectual property rights (IPR) and copyright
- **Risk:** assignment and management of risk,; the need for insurances
- **Disputes:** how disputes will be managed; for example, non-performance issues

Procurement (APM BoK 3.7.3)

“Procurement is the process by which products and services are acquired from an external provider for incorporation into the project, programme or portfolio.”

APM BoK 6th Ed.

An external provider represents anyone outside the project, such as suppliers or contractors, or it may also be another department or division within the host organisation.

Where the external source is a separate legal entity, the terms under which goods and services will be procured will be the subject of a legal contract.

Procurement typically covers the acquisition of:

- standard ‘off the shelf’ goods and services
- goods or services that are designed and provided specifically for the purchaser
- professional advice or consultancy.

The work involved in procuring resources can be a significant project in itself. The way procurement is to be managed is set out in the resource management plan. This describes how the goods and services are to be acquired and includes the development of a procurement strategy.

Procurement Strategy

A procurement strategy addresses the needs of the project whilst respecting any organisational constraints and/or strategic objectives that may be relevant. The strategy reflects a structured approach to securing the necessary resources for carrying out the work of the project.

The resource management plan sets out how the procurement is to be managed and covers factors that include:

- ‘make’ or ‘buy’ decision
- use of single, integrated or multiple providers
- required provider relationships
- provider selection
- conditions and forms of contract
- types of pricing and methods of reimbursement.

The initial decision that needs to be taken is whether to outsource in the first place (make-or-buy). Factors that could be considered include:

- cost
- availability of skilled resource
- capacity
- control (including quality and schedule)
- control of intellectual property
- reliability of supply
- core competence (strategic objectives).

Once a decision has been made to outsource, the strategy needs to consider what form of contractual relationship is most appropriate, and how the supplier will be reimbursed (payment terms). The organisation's procurement policy and quality assurance arrangements will also have a bearing on the agreed procurement strategy. These arrangements may include the requirement to adopt ethical procurement procedures.

Finally legislation such as European Union rules (OJEU – Official Journal of the European Union) might determine the process by which the organisation engages with the open market. OJEU objectives include:

- a more transparent and objective procurement process whilst encouraging competition amongst bidders
- Public Procurement Directives that are intended to ensure fair and non-discriminatory international competition for contracts greater than defined threshold values (different contract thresholds are defined for products and services)

Supplier Reimbursement

Both parties need to be comfortable that the chosen reimbursement method motivates each to satisfy the project objectives. Factors to consider when selecting a reimbursement method include:

- the ability and/or requirement to start work as soon as possible
- how well defined do requirements need to be before a contract is agreed
- who owns the risk(s)
- what level of supplier management is required (effort/knowledge)
- how easy is it to manage/implement scope changes
- how might quality be impacted by specific payment terms

Whilst there are many different forms of supplier reimbursement, these typically fall into three main categories:

Fixed Price	Firm Fixed Price (FFP)	Price set at project start and not subject to change unless scope changes. Very common.
	Fixed Price + Economic Price Adjustment (FP-EPA)	Price set but may be adjusted if economic conditions change (e.g. inflation)
	Fixed Price + Incentive Fee (FPIF)	Fee may be adjusted if supplier meets agreed performance metrics.
Cost Plus	Cost Plus Award Fee (CPAF)	Supplier is reimbursed for all allowable costs but the majority of the fee is only earned based on the satisfaction of certain broad subjective performance criteria.
	Cost Plus Fixed Fee (CPFF)	Supplier is reimbursed for all allowable costs plus an agreed fixed fee payment.
	Cost Plus Incentive Fee (CPIF)	Supplier is reimbursed for all allowable costs plus a predetermined incentive fee for achieving certain targets (typically financial). For example, cost savings may be shared between the supplier and the customer.
Per Unit	Time and Materials (T&M)	Supplier is reimbursed for provision of services (e.g. daily labour rate)
	Unit Rate	Supplier is reimbursed for provision of agreed deliverables (e.g. desktop PC installation)

<p>Target cost</p>	<p>Target cost (A form of CPIF)</p>	<p>Target Price Contracts are based on a cost reimbursable mechanism in which the contractor is reimbursed his costs (on an actual cost basis) subject to the application at the end of the project of a formula which allows the contractor to share any savings made and to contribute towards overspend.</p> <p>The target cost will be made up of three elements, of which two are "visible". These are, first, the base cost which will largely be made up of subcontractor costs as well as necessary items such as plant hire and utility bills. Secondly, the target cost will also include the contractor's overheads, profits and other head office elements which are referred to as his "Fee". The Fee may be a percentage of the actual cost or target cost or, in some cases, a fixed sum. The third element will be the contractor's price for his risk, but this will be subsumed in the Fee</p>
---------------------------	---	--

Some of the advantages and disadvantages of each method include:

Payment Terms	Advantages	Disadvantages
<p>Fixed Price Total price for a well-defined product or service</p>	<p>Financial commitment is known up-front</p> <p>Requires minimum administration from a buyer's perspective</p> <p>Cost risk and project control is the responsibility with the supplier</p>	<p>Contract profit is not visible to customer</p> <p>Must specify exact requirements before project starts</p> <p>Requires detailed scope definition</p> <p>Bid process can take time</p> <p>Where cost is fixed, quality may suffer</p>

Payment Terms	Advantages	Disadvantages
<p>Cost Reimbursable</p> <p>Supplier is reimbursed for the costs they incur in performing the work plus a lump sum or percentage fee</p>	<p>Can appoint supplier earlier than on Fixed Price contracts</p> <p>Supplier profit is visible (not necessarily true on Time and Materials)</p> <p>Easier for customer to influence project direction</p> <p>Easier to manage if time or quality is main objective</p> <p>Most flexibility to customer (e.g. inclusion of scope variation)</p>	<p>No incentive for supplier to minimise costs</p> <p>Significant administration of contract required</p> <p>Less mature approach to project management may exist on supplier side</p>
<p>Incentive Terms</p> <p>Pre-defined incentive fee is paid depending on achievement of key objectives (e.g. time / cost targets)</p> <p>(Pain-Share / Gain Share)</p> <p>Term commonly used when describing incentive payment terms but can take various forms, including a partnership agreement between customer and supplier</p>	<p>Can work well whatever the relative priority of quality, cost and time objectives</p> <p>Both parties share risks and benefits</p> <p>Contract profit is visible to both parties</p> <p>All parties work towards success</p>	<p>Incentives do not always drive the appropriate behaviours (e.g. time-based incentives)</p> <p>Needs a big investment initially to build a stable and trusting relationship</p> <p>Not suitable unless a long term relationship is envisaged - based on realisation of mutual benefits</p> <p>Relies on clear roles and responsibilities between both organisations to manage issues like cost control</p>

Note that Time and Materials payment terms are similar in many ways to cost-reimbursable and occur when the supplier agrees to carry out the work on the basis that the client pays for the effort spent at an agreed rate (hourly, daily, weekly). It is typically used for short-term or emergency engagements.

In addition to the payment terms described above, contracts may be subject to other stipulations based on supplier performance.

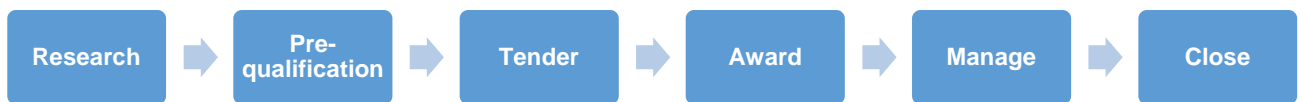
- **Retention:** Retention money provides the customer with a limited fund to pay for the correction of identified defects in the project deliverables.
- **Liquidated Damages:** This is a stipulation in a contract of a monetary amount that must be paid by the contractor if the contractor fails to deliver supplies or perform services as specified in the contract or any subsequent modification. Payments are in lieu of a demonstrably genuine pre-estimate of the damages related to the failure.
- **Variations:** Where external change has an impact on the project objectives, variations might be agreed to account for time, budget and performance considerations. If not managed correctly, variations can be a major threat to project success and/or the customer-supplier relationship.

Provider Selection and Management (APM BoK 3.7.4)

“Provider selection and management is the process of identifying, selecting, appointing and supervising providers through the project, programme or portfolio life cycle.”

APM BoK 6th Ed.

Provider management is a continual process throughout the project life cycle. While the process may vary from sector to sector, the process generally follows six generic steps, as shown in the following graphic:



The process needs to be scalable to be fit for purpose and should not be an onerous overhead on the project or superficial in its simplicity. The steps in this generic process are detailed as follows:

Process Step	Description
Research	<p>Identification of potential providers that have the capability to deliver. This may be made easier where a regularly reviewed and up to date approved supplier list exists.</p> <p>This can be achieved by sending out a pre-qualification questionnaire (PQQ) to potential providers in order to gather information about them.</p> <p>The PQQ can also be used to clarify their capacity, willingness to tender, financial stability and technical experience.</p> <p>References for similar work may also be sought.</p>
Pre-qualification	<p>Research may produce a long list of potential suppliers. Pre-qualification seeks to reduce this long list to a manageable number who are the eligible for contract award and who will then be who will be invited to tender.</p> <p>Provider screening aims to reduce the likelihood of provider non-performance and to ensure the provider will be a responsible and responsive partner.</p>

Process Step	Description
Tender	<p>The shortlist of potential providers can be asked to provide a full bid against a set of defined requirements – typically known as an Invitation to Tender (ITT). This may be preceded by a series of filters: Request for Information (RFI), Request for Proposal (RFP) each of which is designed to reduce the number of potential providers and gain more detailed information from those who successfully pass through each stage.</p> <p>The criteria by which the ITTs will be assessed are determined by relevant stakeholders in the buyer organisation and appropriate weighting factors applied to ensure emphasis on the most important selection criteria. Perhaps not surprisingly research⁵ has shown that price, quality and delivery are the most common criteria.</p> <p>The ITT is compiled and distributed – key elements here are to ensure that the requirements are clearly described and all providers are given an equal chance of success.</p> <p>Records associated with the selection process should be maintained in case of a challenge by an unsuccessful bidder.</p>
Award	<p>This step involves the negotiation and agreement of a contract to supply the goods and services. It is key that all parties understand that a legally binding agreement is being entered into and that the contract is not a casual ‘nod of the head’.</p> <p>Information from previous stages can be turned into contract terms with the two main elements being payment terms and how the contract will be executed (non-payment terms).</p>
Manage	<p>On award of the contract, a relationship is being formed and this needs to be nurtured and carefully and actively managed.</p> <p>Resorting to legal means to resolve contract disputes should be a last resort – the project manager should see the provider as part of the project team and integrate them as such.</p> <p>Effective communication is a key factor in building and managing the relationship</p>

⁵ Worapon Thanaraksakul and Busaba Phruksaphanrat. “Proceedings of the International MultiConference of Engineers and Computer Scientists”

Process Step	Description
Close	<p>Once the goods and services have been provided by the provider, the contract will be closed.</p> <p>This involves:</p> <ul style="list-style-type: none">▪ ensuring all financial arrangements have been honoured▪ ensuring all contract changes have been accounted for▪ implementing the support maintenance contract to repair, or upgrade goods provided▪ conducting a performance review with the provider▪ conducting a lessons learned and capturing these for future use.

11. Project Risk Management and Issue Management

Coverage of Learning Outcomes:

- Risk management process
- Risk as threat and opportunity
- Benefits of risk management
- Distinguish between a risk and an issue
- Escalation.



Risk context (APM BoK 3.5.1)

“The risk context describes the institutional and individual environment, attitudes and behaviours that affect the way risk arises and the way it should be managed.”

APM BoK 6th Ed.

The context of risk in a project will be influenced by many factors. These may include the project management team, the project environment and various stakeholder groups.

Risk attitude

Risk attitude is the natural disposition of an individual or group to uncertainty that matters and is driven by perception. Perception is itself influenced by many factors, including conscious and subconscious reactions to risk. Understanding risk attitude is a critical success factor that promotes effective decision-making in uncertain situations.

Labels like risk averse, risk seeking, and risk neutral are useful to describe alternative positions adopted by people when faced with uncertainty. Each can be useful depending on the situation.

- Risk averse, where risk is avoided
- Risk seeking, where risk is actively sought
- Risk neutral, where risk is neither actively sought nor avoided.

Risk appetite

Risk appetite is the amount of risk an individual, group or organisation is prepared to take in order to achieve their objectives. This represents the desire to take risk in a given situation, influenced by their propensity to take risk and/or the organisational risk culture.

It is important that a project manager understands the risk appetite of their organisation and stakeholders. This will have an effect on the business case, requirements management, project plan, etc.

Project Risk Management (APM BoK 3.5)

“Risk management is a process that allows individual risk events and overall risk to be understood and managed proactively, optimising success by minimising threats and maximising opportunities”.

APM BoK 6th Ed.

Due to their unique and uncertain nature, all projects contain an element of risk. A formal and proactive process for the identification, assessment and management of risk is therefore essential if projects are to be delivered according to their agreed success criteria.

Risk Event

The APM defines a risk event as:

“An uncertain event or set of circumstances that would, if it occurred, have an effect on achievement of one or more objectives”.

APM BoK 6th Ed

This “uncertainty” plays a large part in how the organisation tolerates and manages risk. Note that the definition does not state what type of effect the risk may have on the project. A negative risk would be seen as a threat whereas a positive risk may be viewed as an opportunity.

Sources of risk within projects may be related to internal or external factors and will include items such as resources, technology, environmental factors, safety, competition and market uncertainty. The joint effect of each risk event on the overall project would be known as the “project risk” or “overall risk”, defined as:

“Exposure of stakeholders to the consequences of variation in outcome”, arising from an accumulation of individual risks together with other sources of uncertainty.

Cause – Event – Effect

It can be useful to differentiate between the event (where the uncertainty lies), the ‘cause’ or source of this risk and the ‘effect’ or impact it may have on the project. A good risk description will aid the understanding, prioritisation and management of each risk. Note that the risk may have a different degree of impact on any one or more of the project’s objectives. These may include time, cost, quality, safety, reputation and so forth. It is useful to consider whether your planned response is focused on the cause, risk or effect of each risk response.

An example of a correctly defined risk is:

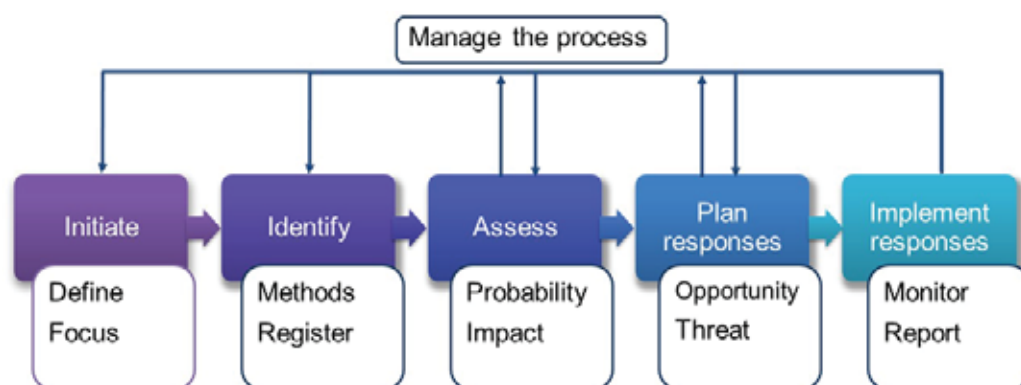
Cause: The team does not have a documented design for the database

Event: meaning that the architecture may not support the agreed functional requirements

Effect: resulting in a high number of defects

Project Risk Analysis and Management (PRAM)

The purpose of risk management is to ensure that risks are proactively identified, assessed and managed in order that the project has a greater likelihood of achieving its objectives within the agreed constraints. This process should be integrated with the other project management processes whether these are related to safety, quality, planning or procurement. The APM PRAM process has five key phases:



1. **Initiate:** Definition of the project and focusing the risk management process to fit the needs of this project
2. **Identify:** What are the risks?
3. **Assess:** How significant is each risk in terms of its probability of occurrence and its impact should it occur?
4. **Plan responses:** What can be done to manage the risk? Who is best placed to monitor the risk and carry out the response action?
5. **Implement responses:** Carry out the agreed actions, update project documentation and continually monitor and mitigate risk.

“**Manage the process**” relates to activities that integrate the previous five steps through continuous review of the risk management plan, identifying new risk, assessing new and reassessing existing risks, planning and re-planning responses and learning the lessons from responses implemented.

It is important to note that the phases will be iterative in nature and that the overall process must be actively managed in order for it to be implemented successfully. The

Manage Process activity will review the effectiveness of each phase of the risk management process as well as ensuring that the process is implemented correctly.

Initiate

The purpose of the 'Initiate' phase is to determine *how* risk will be managed on this project. This may entail the creation of a Risk Management Plan that documents this process (note that this plan is likely to be heavily influenced by agreed organisational processes). The two main activities carried out during this phase are:

- **Define Project:** ensure the team and other relevant stakeholders have a firm understanding of the project's objectives, scope and other relevant constraints. Without this understanding it is unlikely that the risk management process can be appropriately tailored to the project's specific requirements.
- **Focus Risk Management Process:** the objectives of the risk management process must now be documented to ensure that it is correctly applied to this project. Factors to consider include the size, complexity and strategic significance of the project. These factors will help determine the most appropriate process for managing risk in terms of the steps, tools, roles and reports that should be adopted. The scales for probability and impact are defined in this part of the process.

Identify

Risk identification typically involves the project manager, team members, customers, subject matter experts and other relevant stakeholders. (See Risk Techniques 3.5.2. for further details)

Risk Register

The description of each risk (including its probability and impact ratings) along with the details of the chosen response should be documented in the Risk Register. The register should also identify the owner for each risk (i.e. the person best placed to monitor the residual risk, or full risk if accepting the threat or rejecting the opportunity). The content of the risk register may differ across different organisations. For example, some organisations may include details of the risk proximity (i.e. when a particular risk is due to occur).

Assess

The risks should be qualitatively assessed to determine the applicable probability of each risk occurring and the possible impact on any of the project objectives (e.g. time, cost, quality, safety etc.) should it occur. It is useful if the organisation determines appropriate quantitative thresholds for the classification of each risk (e.g. very low – very high). Each risk can then be plotted on a probability-impact grid⁶.

⁶ See Risk Techniques 3.5.2. for further details

Some organisations may also ask for a report on the project's 'top-5' risks. This can be determined by assigning numerical scores for probability and impact then multiplying these factors to provide an overall score for each risk.

(Note that many organisations may also perform quantitative analysis of the combined risks on the overall project. This may involve the use of tools such as Monte-Carlo analysis or decision trees.)

Plan Responses

Risk responses will generally fall into one of four categories for threats or opportunities⁷.

Threats	Opportunities
Avoid	Exploit
Reduce	Enhance
Transfer	Share
Accept	Reject

Implement Responses

The 'Implement Responses' phase ensures that risk response actions have been undertaken and have achieved the desired outcome. Risk owners should be held accountable for the outcome of each assigned risk. Risk events should be continuously monitored and stakeholders updated on their new status as required.

Communication regarding risks will be largely provided through updates of the Risk Register and other formal status reporting tools. The effectiveness of the risk management process should also be regularly reviewed and agreed process modifications documented in an updated risk management plan.

Risk Management: Benefits and Costs

A number of 'hard' and 'soft' benefits are likely to be derived from the successful management of risk on projects. Hard benefits are likely to be more tangible and easier to quantify – for example, better decision making through appropriate quantification and communication of contingency, more appropriate contracts etc.

Soft benefits may revolve around the people side of risk management and the development of a more mature organisational approach to risk management.

Critics of formal risk management may argue that the process creates a false sense of security and is merely an exercise in form-filling. This can lead to bad decisions concerning risks and risk responses.

⁷ See Risk Techniques 3.5.2. for further details

The International Journal of Project and Business Risk Management, Volume 1, Number 1, 1997 provides the basis for a number of distinct benefits.

Hard Benefits

H1 - Enables better informed and more credible plans, schedules and budgets

Planning is a statement of what needs to be done, together with estimates of resources (time, cost, and labour) needed to achieve it. Identifying the risks and risk factors and allocating tolerances and contingencies helps to create a more objective description of the tasks and the related budgets and schedules, providing enhanced credibility to the plans.

H2 - Increased chance of project success

Obviously, the more realistic the project plans and the greater the understanding of the project and its outcomes by the project team, along with SMART objectives, the more motivated the team along with enhanced commitment, the greater the chance of delivering a successful project.

Managing the project risks reduces the risk exposure through reducing the threats to an acceptable level, while at the same time increasing the opportunities that present themselves, leading to a higher probability of project success.

H3 - Leads to the use of the most suitable type of contract

All forms of contractual relationship along with the payment terms introduce uncertainty into the project. Understanding the risk exposure helps indicate which contractual relationship and which payment terms would be most suitable to the form of contract.

Risk analysis also helps expose areas of (potential) conflict between client and contractor and these can then be proactively addressed early in the project, reducing the likelihood of disagreement due to misunderstanding.

H4 - Allows a more meaningful assessment and justification of contingencies

Too often there is an over or under provision of contingency because this is based on the gut-feel of the project manager. This results in the ineffective utilisation of scarce resources.

Risk management helps identify and quantify the amount of contingency required to provide an acceptable confidence level and the risk budget can be managed effectively throughout the project life cycle.

H5 - Discourages acceptance of financially unsound projects

Effective risk management applied particularly in the early stages of the project can help identify the degree of risk exposure and introduce realism into the decision making process.

Where a project is unlikely to meet its objectives, the decision to cancel further work before significant costs are expended can be taken.

H6 - Generates metrics for use on future projects

We do not learn the lessons! Rather, lessons are identified, but then conveniently filed away, not to be referenced again. Where similar problems arise on different projects, mitigating actions can be implemented to limit their impact.

The identification and recognition of the early warning signs of impending problems can be highlighted and pro-active actions taken to respond effectively to these.

H7 - Enables an objective comparison of alternatives

Effective project management results in a plan that contains sufficient decision points at which alternative courses of action need to be evaluated. Risk management allows for the relative threats and opportunities associated with each of these alternatives to be evaluated on a common basis, in support of effective decision making.

H8 - Identifies and allocates responsibility to the best risk owner

Risk analysis permits the identification and allocation of a single risk owner, providing assurance that the risk will be responded to in the most appropriate manner. This will also ensure that where ownership is ambiguous, this ambiguity can be removed.

Soft Benefits

S1 - Improves corporate experience and general communication

Improved communication has been identified as a major benefit of the risk management process. A mature risk management environment provides a framework for identifying and discussing risks in a neutral, blame-free manner. The emphasis should be on positive action rather than recrimination.

A mature risk management environment encourages feedback from projects that have failed, highlighting the areas that would require more detailed attention in the future and allowing for the lessons learned to be implemented effectively.

S2 - Leads to a common understanding and improved team spirit

Risk management brings the whole project team together and builds on the diversity of skills and competencies that each team member can bring to the project. Threats can be seen as the “enemy”, while opportunities are “prizes” to be won. This stimulates the team members in pursuit of a common goal.

Winning in a challenging environment is a powerful, motivating and team building influence.

S3 - Helps distinguish between good luck/good management and bad luck/bad management

In many organisations rewards such as promotion, more interesting jobs, higher remuneration and more challenging projects result from successful project delivery. Many associate problematic projects with bad project management and successful projects with good management.

Reality dictates that some projects are inherently more problematic than others. An understanding of the inherent risk in a project provides a basis for assessing the project manager's effectiveness allowing for a distinction between good management – good luck and bad management – bad luck. This distinction leads to individual behaviour being better aligned with corporate and project goals.

S4 - Helps develop staff competency and ability to assess risk

Undertaking risk analysis on a project makes people more aware that risks exist in their area of influence. This allows them to look out for them in the current project as well as in future projects, thus improving the competence of the team in preparing and executing plans.

Allocating responsibility for the project success or failure in a demonstrably unbiased manner provides for an objective consideration and analysis of the facts. This means that the project manager and/or team will not be held responsible for something that could not reasonably have been prevented.

S5 - Focuses project management attention on the real and most important issues

A formal mature approach to risk management helps identify those uncertainties that have the potential to most seriously threaten or enhance project success. Attention and effort can then be focussed on the key issues rather than being diverted to those matters that seem important, but do not significantly affect achieving the project objectives.

S6 - Facilitates risk taking, increasing the benefits to be gained

Project success is predicated on taking a calculated risk. In the absence of formal risk management the outcome is unpredictable and opportunities are not exploited. Formal risk management permits the appropriate mitigation and fall-back plans to be implemented in a controlled environment thus allowing the organisation to take a greater level of risk, with lower contingency, improving the overall return on investment.

S7 - Demonstrates a professional and responsible approach to stakeholders

Full analysis and understanding of the requirements leads to decision making aimed at satisfying these requirements. Effective project risk management encourages a mature approach to planning, which in turn, enhances the overall quality of the output. Sharing this information leads to improved understanding and stronger relationships.

Formal risk management provides the stakeholders with the confidence that the project is being managed effectively.

S8 - Provides a fresh view of the personnel issues in a project

A mature approach to risk management helps senior management reach informed decisions about the most appropriate project manager – a less experienced project manager can be appointed to manage a less risky project, while a more experienced project manager can be appointed to manage a more risky project.

Risk techniques (APM BoK 3.5.2)

“Risk management techniques are used to identify, assess and plan responses to individual risks and overall risk.”

APM BoK 6th Edition

Risk techniques used in identification, assessing and responding to risks are a set of tools and approaches that can be used to maximise the effectiveness of risk management, drawing from many different sources. Some techniques are common-place across a wide range of projects, for example the probability-impact grid, whereas others may be developed internally and specific to organisations, such as the content check lists used in risk identification.

Identification

This is an iterative process that can utilise a combination of a number of the following tools and techniques:

Tool	Description	Strength	Weakness
Assumptions analysis	Assumptions are documented to assess the probability that each factor will be met and the impact if they are not.	Ensures stakeholders have a common understanding of each factor	Most likely to only identify low level risks. If a situation had high uncertainty it should already be a risk.
Constraints analysis	Constraints are reviewed to consider whether the limit imposed introduces risk to the project.	Particularly good for identifying opportunities (What if this constraint were removed?)	If a constraint cannot be changed it may be assumed that nothing can be done about the risk.
Check lists	Risks are identified against criteria derived from previous projects or other standard approaches (e.g. health and safety areas).	Makes full use of experience to prevent repetition of issues	Check list is not exhaustive and may miss project specific risks

Tool	Description	Strength	Weakness
Prompt lists	Uses generic headings to stimulate thought across a breadth of different areas (may also be shown diagrammatically through the use of a Risk Breakdown Structure – RBS)	Ensures that team think laterally about multiple areas that may impact the project	Again not exhaustive and does not go into any depth of detail in each topic area
Brainstorming	Group session that attempts to engage project stakeholders from each discipline and utilise their experience	Quick and generates multiple ideas and participation	Can be biased by a limited number of the participants and can also be difficult to control
Interviews	Structured discussion of project risks when it may not be suitable to have a group meeting	May be more appropriate for sensitive issues and allows for more in-depth discussion	Time-consuming and does not allow for cross-fertilisation of ideas
SWOT analysis	Identification of the project's strengths, weaknesses, opportunities and threats.	Ensures a balanced approach to the definition of positive and negative risks	Has a tendency to over-simplify the situation by classifying each factor into a category where it may not strictly fit

Assess

Techniques used for risk assessment may be qualitative or quantitative.

Qualitative techniques rely on relative measure of risk based on ranking or separation into descriptive categories such as low, medium, high; not important, important and very important; or on a scale from 1 to 10. These are based on judgement or opinion.

Quantitative techniques try to work out the value of overall risk in financial or numerical terms. Examples of quantitative techniques include Monte Carlo analysis and sensitivity analysis.

Monte Carlo Analysis refers to a technique in project management where a manager computes and calculates the total project cost and the project schedule many times.

Sensitivity analysis is very useful when attempting to determine the impact the actual outcome of a particular variable will have if it differs from what was previously assumed. By creating a given set of scenarios, the analyst can determine how changes in one variable(s) will impact the target variable.

The APM PRAM Guide (Project Risk Analysis and Management) sets out parameters that can be used to determine the severity of individual risks based on a five-point scale for both Probability and Impact.

An example from the PRAM Guide suggests the following thresholds for each level:

	PROBABILITY	IMPACT		
		TIME	COST (£K)	PERFORMANCE
VHI	70% +	4 mths +	8%+	Significant failure in critical performance area
HI	50% to <70%	2 to <4 mths	4% to <8%	Minor failure in critical area
MED	30% to <50%	1 to <2 mths	2% to <4%	Failure in area of secondary importance
LO	10% to <30%	2 wks to <1 mth	1% to <2%	Failure in area of minor importance
VLO	<10%	<2 weeks	<1%	Temporary defect

The Probability and Impact for each risk can then be plotted on a matrix:

PROBABILITY	VH 0.90					
	H 0.70					
	M 0.50					
	L 0.30					
	VL 0.10					
	VL 0.05	L 0.10	M 0.20	H 0.40	VH 0.80	
		IMPACT				

Note that different values are used on the Probability and Impact scales. This results in a different priority order for risks with the weighting being towards the Impact. For example, 'VH Impact VL Probability' is considered to be of greater concern than 'VL Impact VH Probability'.

Plan Response

Threats	Opportunities
Avoid: Threats may be avoided by eliminating the cause (e.g. removing a work package)	Exploit: The scope is changed to ensure that the opportunity definitely happens
Transfer: The responsibility for bearing the impact of a risk is passed to another party (most useful for financial impact)	Share: Some or all of the risk is allocated to another party is who best able to realise the benefits
Reduce: An investment of time or cost to mitigate the probability and/or impact of a specific risk	Enhance: The probability and/or impact is increased by some form of proactive measure
Accept: Do nothing to actively change the probability or impact	Reject: reject the opportunity because the benefits are not significant enough to warrant action

When considering risk response actions it is also necessary to also consider:

- **Secondary risks:** a risk even that may occur as a result of a risk response
- **Residual risk:** the risk that is left after a response strategy has been implemented.

The response to a Threat that does occur despite the action taken is known as the '**Fall-back Plan**' (or sometimes referred to as the Contingency Plan). This is a plan that sets out the actions to be taken in such a situation. For example, what to do if the fire alarm sounds in a building.

The response to an Opportunity that occurs is known as '**Plan an Option**'. This is a plan to be used if the project develops such that the opportunity can be exploited.

Delegation (APM BoK 2.1.3)

“Delegation is the practice of giving a person or group the authority to perform the responsibilities of, or act on behalf of, another.”

APM BoK 6th Ed.

The objective of delegation is to get work done by others.

While delegation is primarily a mechanism for distributing work, it is also a tool for motivating and training teams and individuals to realise their full potential and encourage them to use and develop their skills and knowledge.

Delegation is not just about instructing others to do something, but is the process of entrusting authority and responsibility to others. This requires the project manager to consider matching the work to the behaviour and competences of the delegated resources and give them the authority to react to situations and make decisions. This requires a mix of process and skill on the part of the project manager.

The project manager must ensure that:

- they have the authority to and can delegate
- they are clear on what they are delegating
- there is sufficient time to delegate effectively.

Further, the project manager needs to recognise that there are some key functions and activities that must remain with them. Delegation is a process of ***“plan, monitor and control”*** and allows the project manager to define:

- **What has to be done** – providing a clear specification of the work being delegated
- **The control parameters to be maintained** – identifying and agreeing the performance indicators and tolerances that will be applied
- **The monitoring and reporting mechanisms** – providing a clear understanding of how progress will be measured and communicated
- **Actions to be taken** to bring the delegated work back on track should the control parameters be exceeded – identifying and agreeing the escalation and issue management procedures.

Before allocating work to a team member or group, the project manager needs to consider the following:

- knowledge of the person(s) and their working style(s)
- agreeing the level of training or coaching required
- identifying and implementing feedback mechanisms
- identifying and implementing reward mechanisms.

The person to whom work is being delegated takes responsibility to perform certain duties and has to accept possible reprimands for poor performance, whereas the project manager has the responsibility to support the team member and accept ultimate accountability for poor performance.

Delegating responsibility and challenging work is highly motivational for the majority of team members, but the project manager must consider the barriers that could prevent delegation from being effective. These barriers include:

- **Confused lines of authority** – in a matrix environment an individual may report to a line manager as well as the project manager
- **Availability of appropriately skilled staff** – project managers do not always have the luxury of hand picking their team and thus have to delegate work to people who are not ideally qualified to perform the delegated work
- **Blame culture** – without a clear definition of the “*plan, monitor and control*” actions detailed earlier in this text and an environment where mistakes are not tolerated, there may be a hesitancy or reluctance to accept responsibility
- **Excuses by the delegator** – a reluctance on the part of the delegator to clearly define the specifications and communicate the “*plan, monitor and control*” actions detailed earlier in this text to the team member, using the excuse –“*by the time I have explained it, I could have done it myself!*” is not an acceptable approach

12. Project Quality Management

Coverage of Learning Outcomes:

- Describe quality management
- Quality planning, assurance, control and continual improvement.



Project Quality Management (APM BoK 3.6)

“Quality management is a discipline for ensuring that outputs, benefits, and the processes by which they are delivered, meet stakeholder requirements and are fit for purpose.”

APM BoK 6th Ed.

Despite being one of the key constraints in any project (the others being time and cost), quality is arguably the most subjective and most difficult to agree with the project's stakeholders.

Project managers should remember that quality pertains to the quality of the project management processes as well the outputs or deliverables that these processes create.

Project Quality Management

Quality management covers four primary processes:

- **Quality Planning:** defining what standards are acceptable and then *how* these standards will be met
- **Quality Assurance:** Providing confidence that the portfolios, programmes and projects are being well managed. Ensuring that your processes effectively create consistently acceptable products and that the processes are constantly reviewed and independently audited
- **Quality Control:** Inspecting and measuring the deliverables to ensure that they conform to the agreed specification and meet stakeholders' expectations
- **Continuous Improvement:** Systematically identifying and implementing process improvements so that future projects benefit from past experience

Present thinking dictates that quality should be 'built into' your processes through the *proactive* implementation of effective quality assurance. This is more cost effective than *reactively* finding errors through quality control methods such as testing and inspection; no amount of inspection can change the quality of a product or service.

Quality Management

Quality management on your project will be largely constrained by your organisation's quality methods and processes. These will be heavily influenced by whatever quality philosophy, systems or models have been adopted.

Concept	Example	Description
Philosophy	Total Quality Management (TQM)	<p>TQM is a philosophy for managing the organisation in a way that enables it to meet the needs of its stakeholders in an efficient and effective way. Although it is led by senior management, the guiding principle of TQM is that it applies to every function/activity within the organisation. TQM requires:</p> <ul style="list-style-type: none"> ▪ Senior management commitment ▪ Excellent inter-departmental communication ▪ The encouragement and implementation of 'shop-floor' initiatives ▪ Good relationships with both suppliers and customers <p>System, tools and models are employed to help achieve the principles listed above.</p>
System	ISO9000	<p>Quality management systems (QMS) aim to standardise work into an organised and documented system. ISO9000 is a set of five international standards (9000-90004) that provide guidance in the development and implementation of an effective QMS. Crucially, a QMS states <i>what</i> must be done, but not <i>how</i> it should be done. In its initial form, ISO9000 was heavily criticised for being overly bureaucratic without significantly improving quality. Later revisions have tried to address this criticism by widening its scope to the following eight principles:</p> <ul style="list-style-type: none"> ▪ Customer focus ▪ Leadership ▪ Involve people ▪ Process approach ▪ System approach ▪ Continual improvement ▪ Factual decisions ▪ Mutually beneficial relationships

Concept	Example	Description
Model	European Foundation Quality Model (EFQM)	<p>Models such as the EFQM Excellence Model are used to assess business excellence. The assessment involves an independent team of assessors evaluating 30,000+ European organisations against a set of weighted criteria that are set apart as follows:</p> <p>Enablers (what the organisation does and how it does it)</p> <ul style="list-style-type: none"> ▪ Leadership ▪ People ▪ Strategy ▪ Partnerships and resources ▪ Processes, products and services ▪ Results (what the organisation achieves) ▪ People results ▪ Customer results ▪ Society results ▪ Key results (KPIs) <p>The RADAR scoring model used in EFQM requires organisations to:</p> <ul style="list-style-type: none"> ▪ Define its required results ▪ Plan and develop approaches ▪ Deploy these approaches ▪ Assess and refine the approaches based on learning

There is considerable overlap between quality philosophies, systems and models. The philosophy can be thought of as a systemic approach to quality management which focuses on the effectiveness of the whole organisation. The QMS defines the systematic quality methods to be adopted and various models assess the excellence and result of the methods that have been implemented. Models also facilitate the benchmarking of different organisations to assess their quality management capability.

Quality Plan

Quality planning requires the project team to assess the information available to them at the start of the project and figure out how they will prevent defects and measure quality. This will involve fully understanding stakeholders' needs and how you will measure achievement of these expectations in relation to the quality of the deliverables. The content of the quality plan will vary depending on the needs of the organisation and the project, but at a minimum is likely to consist of the following sections:

- quality standards to be achieved
- quality methods and procedures to be used (these may be constrained by the adoption of a formal QMS such as ISO9000)
- specific quality tools (e.g. control charts, scatter diagrams etc.)
- records and reports that will be created (e.g. quality register)
- timing of reviews, audits and checks
- specific roles and responsibilities relating to quality (e.g. quality reviewer, QA engineer).

PDCA Cycle

A recurring theme across the various quality management themes is the Plan-Do-Check-Act (PDCA) cycle defined by the American quality guru, W E Deming.

- **Plan:** establish the objectives and processes necessary to deliver the expected results
- **Do:** implement the processes (normally on a smaller scale first to check the likely impact)
- **Check:** measure the results of the new process against the expected results
- **Act:** analyse the difference and propose improvement actions as required.

The PDCA cycle may be used to help guide the implementation of quality methods and tools or might even form the overall structure of business improvement initiatives.

Quality Assurance

Quality Assurance (QA) aims to proactively prevent defects and problems occurring. Effective implementation of QA will ensure that quality processes are effective and are consistently adopted. Methods must be clearly documented and communicated with relevant training being provided if required. QA will also entail independent review and regular audit of how quality processes are followed. These reviews may also identify suitable lessons and continuous improvement activities.

The QA process may be supported by an independent quality assurance department. The QA department might also carry out the quality audits. Audits have the following objectives:

- identify the best practices that are being implemented by the project teams
- identify gaps in the adoption of the processes
- share best practice across the organisation and/or industry sectors
- process support to project teams who require help in the implementation of quality processes
- ensure that lessons learned are stored in a repository and disseminated across the organisation.

Quality Control

Quality Control (QC) entails the measuring and inspection of deliverables to ensure that they conform to the agreed acceptance criteria. Both QA and QC will use a number of common tools that help to ensure that quality expectations are satisfied. Whether these tools are used in a proactive or reactive nature dictates whether the QA or QC process is being applied during their use.

Acceptance Criteria

'Fitness for purpose' can be a very difficult concept to define and measure but the term mandates that the project team fully understand the project 'need' (or purpose) before expectations can be met. The quality of the deliverables is typically expressed by agreeing specific acceptance criteria that quantifies the requirements and conditions for each deliverable and the project as a whole. The satisfaction of these criteria will be tested during the quality control process.

Quality Tools

The Japanese quality guru Ishikawa listed ‘Seven Basic Tools of Quality’:

Tool	Description
Control (Run) charts	<p>Monitor, control and improve process performance over time by studying output variance and why it occurs.</p> <p>The process is said to be under control if the variation is random and within the agreed control limits. The use of the tool is typically proactive in that it attempts to define process shifts and trends before the process starts to operate outside its accepted limits (e.g. the ‘rule of seven’). If the measurement indicates performance outside the agreed limits then the process should be stopped in order in order to assign a suitable cause.</p> <p>Note that control charts are heavily used in quality methods such as Six-Sigma which are heavily focused on the minimisation of variance and resultant defects that may be caused. Six-sigma’s DMAIC cycle will utilise a number of quality tools to monitor and improve performance (the eventual target being a level of quality which has <3.4 defects per million occurrences).</p>
Check sheets	<p>Allow the team to systematically record and compile data and check performance against agreed criteria and/or historical information. The check sheet may also be used to collect data over time in order to quantify patterns and trends.</p>
Cause and effect diagrams	<p>Sometimes known as fishbone or Ishikawa diagrams, these diagrams graphically document the possible causes of a single effect (issue) and cluster these into major areas.</p> <p>Cause and effect diagrams are heavily used in root cause analysis and may be used in conjunction with other techniques such as ‘5-whys’. Sometimes these tools are criticised for being overly simplistic and do not go into enough detail to determine the true root cause. There may also be multiple causes as opposed to a single cause. Ultimately the tool is heavily reliant on the experience of the people using it.</p>
Histograms	<p>Graphically represent frequency distribution in bar form. They are very good for displaying large amounts of data that would be difficult to interpret in tabular form.</p> <p>The histogram is commonly used to analyse where the distribution is centred, how wide the spread of data is and what shape the distribution is (e.g. normally centred on the mean or skewed in some way).</p>

Tool	Description
Pareto charts	A special type of histogram where different quality issues may be prioritised from high to low in terms of their frequency of occurrence. This allows the project team to focus on the issues that cause the highest number of issues.
Flowcharts	Dictate the individual steps, logical sequence and decision points within any process. Flowcharts help to identify unexpected complexity, problem areas and redundant steps. They are commonly used to help analyse and improve business processes. They can then be used to check whether a process is being followed correctly from start to finish.
Scatter diagrams	<p>Scatter diagrams study and identify the possible correlation between two variables. The diagram provides a visual and statistical method of testing the strength of a potential relationship. Although positive or negative correlation may be suggested, further analysis is typically required to provide there is an actual causal relationship.</p> <p>A suitable example of a positive correlation might be the rating of delegate feedback as trainer experience increases.</p>

As well as the '7 basic tools', other tools may be used to help ensure that quality expectations are met.

Statistical Sampling: Statistical or acceptance sampling is heavily used in high-volume manufacturing where it is not cost effective to test 100% of the outputs. The sample may check process inputs and/or outputs. The acceptance quality level (AQL) is the highest number of defective components that may be contained in any one batch as considered acceptable to the customer. Note that the customer is accepting the risk that any one batch may contain untested defective items. The supplier is taking the risk that a batch considered as being unacceptable may still contain good parts. The quality engineers will determine suitable sample sizes and these must be agreed by the customer.

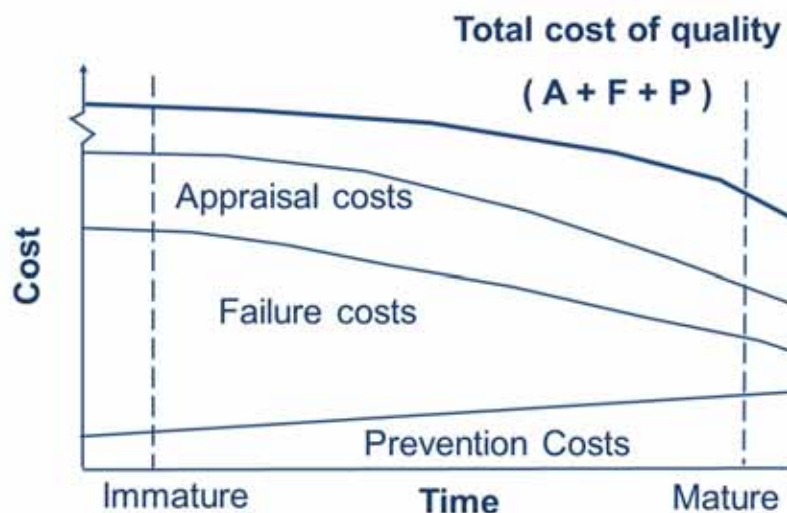
Inspection: Inspection is the examination of a deliverable to determine whether it conforms to the agreed specification or standard. They may also be known as peer reviews, audits and walkthroughs amongst other terms. Where safety and/or finance are involved, it is common for the inspection to be carried out by an independent party – this concept is typically known as 'segregation of duties' (the term also applies to separation of functions, for example the separation of procurement ordering and payment activities).

Cost of Quality

The costs of quality can be broken down into:

Type	Category	Description
Conformance	Prevention	Costs associated with the definition and implementation of agreed quality management methods and procedures (for example, the creation of a QMS and training staff in its use)
	Appraisal	Costs of inspection and testing to ensure conformance to specification
Non-conformance	Internal failure	Issues identified by the project team which may result in rework or scrap
	External failure	Issues that are detected by the customer. These may include liabilities and warranty work and ultimately, loss of future business and reputation

The total cost of quality is the combined sum of the above costs. Organisations will try to optimise the cost of conformance (especially preventative costs) as prevention should typically be cheaper than failure due to the rework required and possible loss of business.



Benefits of Quality Management

In any competitive environment, the benefits of understanding quality and ensuring that stakeholders' expectations are satisfied should be obvious. All organisations aim to be more efficient and effective in the implementation of their operations and project execution; effective quality management is a key component of doing so. Typical benefits include:

- increased delivery credibility leading to higher confidence from management, customers, legislative bodies etc.
- improved decision-making resulting from better quality source data and information
- more consistent approach to project activities leading to less variation in the process outputs
- more efficient processes as effort is directed to the areas that will result in better quality for less incremental cost
- significant reduction in errors detected by the delivery organisation and/or customer
- improved customer satisfaction
- lessons learned are disseminated throughout the organisation through effective QA and continuous improvement mechanisms.

Reviews (APM BoK 3.6.2)

“A review is a critical evaluation of a deliverable, business case or project, programme or portfolio management process.”

APM BoK 6th Ed.

Performance, continued viability of the work, benefits realisation and quality of the outputs are all subject to review. An objective review of the project is a key requirement of effective project governance and therefore formal reviews of the health of a project are essential throughout the life cycle.

The project management plan will form the basis for the majority of the project reviews although we must also consider the impact on the business case. Indeed, the business case will form the basis of the benefits realisation review that is undertaken during the operational phase of the project.

Typically three aspects are reviewed:

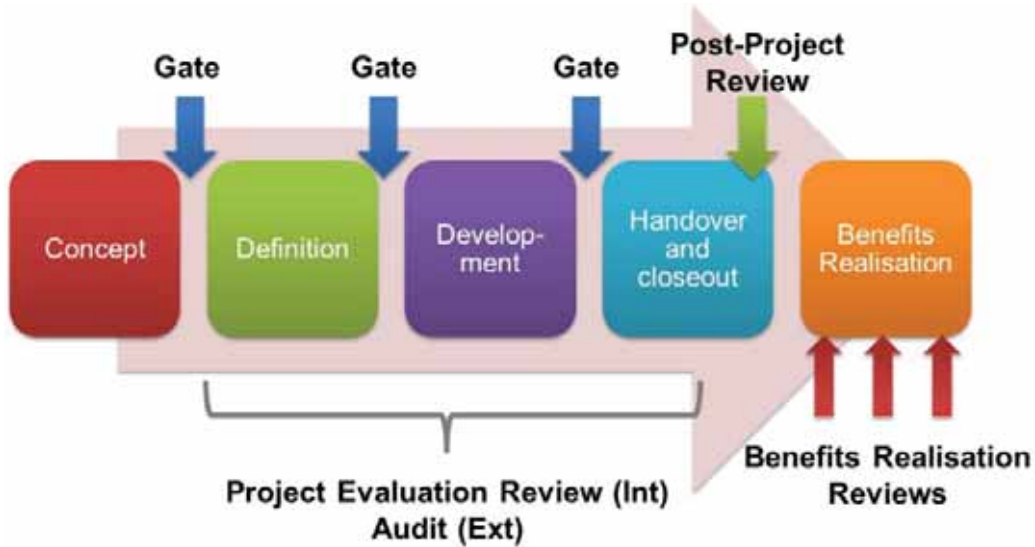
- **Management processes:** as part of assurance, management processes should be reviewed to ensure that the project is well managed
- **The business case:** the continued viability, desirability and achievability of the project should be reviewed at specific, set points in the project life cycle. The outcome of such a review may well be the early termination of a project.
- **Deliverables:** the review could take the form of a procedure for quality control of the outputs created by the project

Project Reviews Across the Life Cycle

Reviews can be event driven or time driven. Typical event driven reviews will take place on the delivery of a major output or completion of a project stage. Time driven reviews are those that are scheduled in the plan.

The frequency of reviews is generally set out in the quality management plan. To be effective, a review should include:

- controlled attendance with attendees who will add value to the review
- a defined agenda, including the findings of previous reviews
- a report with clear actions and owners



Typical project reviews include:

Review	Description
<p>Project Evaluation Review</p>	<p>The project evaluation review provides the project manager and the team with an opportunity to formally review the present health of the project.</p> <p>This will include evaluation of the likely achievement of the project success criteria as well as reviewing the suitability of technical and management processes.</p> <p>Corrective actions and lessons should be agreed and documented. At a minimum, a project evaluation review should be held before every stage-gate review.</p>

Review	Description
Post-Project Review	<p>The post-project review should be undertaken after the project deliverables have been handed over but before the formal closeout of the project and disbanding of the team.</p> <p>The purpose is to learn lessons and improve ability to deliver future projects by:</p> <ul style="list-style-type: none"> ▪ evaluating the effectiveness of project management ▪ comparing what was actually delivered against the original requirements ▪ assessing performance ▪ capturing stakeholder’s opinions of how the project was delivered ▪ disseminating the findings <p>This review should evaluate whether a project has achieved its agreed success criteria and also to agree positive and negative lessons that can be shared with future projects.</p> <p>The performance of the whole team can be evaluated against the project management plan and excellent performance recognised. The attendees for the post-project review may include the project sponsor, the project office and in certain circumstances the client and contractors.</p>
Audit	<p>Where a review is conducted by an external party (e.g. project office or external auditor) then the review is known as an audit. The audit may be triggered by concerns regarding the governance of the project and/or to determine its continuing viability.</p>

Review	Description
Peer Review	<p>Peer review is the evaluation of creative work or performance by other people in the same field in order to maintain or enhance the quality of the work or performance in that field.</p> <p>It is based on the concept that a larger and more diverse group of people will usually find more weaknesses and errors in the work or performance and will be able to make a more impartial evaluation of it than will the person or group responsible for creating the work or performance.</p> <p>Peer review utilises the independence, and in some cases the anonymity, of the reviewers in order to discourage cronyism (i.e., favouritism shown to relatives and friends) and obtain an unbiased evaluation. Typically, the reviewers are not selected from among the close colleagues, relatives or friends of the creator or performer of the work, and potential reviewers are required to disclose of any conflicts of interest.</p> <p>Peer review helps maintain and enhance quality both directly by detecting weaknesses and errors in specific works and performance and indirectly by providing a basis for making decisions about rewards and punishment that can provide a powerful incentive to achieve excellence. These rewards and punishments are related to prestige, publication, research grants, employment, compensation, promotion, tenure and disciplinary action</p>
Gate Review	<p>Gate reviews (also known as stage-gates) are typically held at the end of each phase of the project life cycle. It marks a key decision point in the project where the sponsor will sanction the continuing investment in the project based on a formal evaluation of its present and forecasted progress.</p> <p>It is important that external factors that may have impact the viability of the business case are also considered.</p>
Benefits Realisation Review	<p>The sponsor should be held accountable for the realisation of the project benefits. These benefits typically materialise at a future date where the project deliverables have been in operational use for some time. Multiple benefits realisation reviews may be required depending on the nature of the project.</p>

Benefits of Project Reviews

Project Reviews are necessary for a variety of reasons. Although not always welcomed by the project team, benefits of a formal examination of a project's health might include:

- better decision-making
- *objective* review of a project's health
- improved governance of projects
- sharing of lessons learned (and the subsequent improvement of technical and management processes)
- more timely implementation of corrective action
- increased stakeholder confidence (including senior management, project funders and customers)
- increased likelihood of project success (this includes achievement of the agreed success criteria and delivery of benefits).

Course Content and APM BoK Topics Cross-reference:

APM Body of Knowledge Topics	Page
APM BoK 1.1 Governance	54
APM BoK 1.1.1 Project Management	46
APM BoK 1.1.2 Programme Management	35
APM BoK 1.1.3 Portfolio Management	40
APM BoK 1.1.4 Infrastructure Project Office	19
APM BoK 1.1.6 Life Cycle	23
APM BoK 1.1.7 Success factors and maturity	102
APM BoK 1.1.8 Project Sponsorship	15
APM BoK 1.2.1 Environment	31
APM BoK 1.2.2 Operations Management	122
APM BoK 2.1.1 Communication	62
APM BoK 2.1.2 Conflict Management	64
APM BoK 2.1.3 Delegation	215
APM BoK 2.1.5 Leadership	77
APM BoK 2.1.6 Negotiation	71
APM BoK 2.1.7 Teamwork	87
APM BoK 3.1.1 Business Case	96
APM BoK 3.1.2 Control (incl. Earned Value)	176
APM BoK 3.1.3 Information Management	111
APM BoK 3.1.4 Organisation	5
APM BoK 3.1.5 Planning (incl. Estimating)	116
APM BoK 3.1.6 Stakeholder Management	124

APM BoK 3.2 Scope Management	139
APM BoK 3.2.1 Benefits Management	98
APM BoK 3.2.2 Change Control	151
APM BoK 3.2.3 Configuration Management	149
APM BoK 3.2.5 Requirements Management	145
APM BoK 3.3.1 Resource Scheduling	172
APM BoK 3.3.2 Time Scheduling	158
APM BoK 3.4.1 Budgeting and Cost Control	179
APM BoK 3.4.3 Investment Appraisal	107
APM BoK 3.5 Project Risk Management	203
APM BoK 3.5.1 Risk context	202
APM BoK 3.5.2 Risk techniques	210
APM BoK 3.6 Project Quality Management	218
APM BoK 3.6.2 Reviews	227
APM BoK 3.7 Resource Management	171
APM BoK 3.7.1 Contract	189
APM BoK 3.7.3 Procurement	192
APM BoK 3.7.4 Provider Selection and Management	198
APM BoK 4.2 Health and Safety	132
APM BoK 4.4 Law	128

Course Content Alphabetical Listing:

APM BoK Topics	Page
Benefits Management (APM BoK 3.2.1)	101
Budgeting and Cost Control (APM BoK 3.4.1)	179
Business Case (APM BoK 3.1.1)	99
Change Control (APM BoK 3.2.2)	154
Communication (APM BoK 2.1.1)	62
Configuration Management (APM BoK 3.2.3)	152
Conflict Management (APM BoK 2.1.2)	67
Contract (APM BoK 3.7.1)	199
Control (incl. Earned Value)n (APM BoK 3.1.2)	186
Delegation (APM BoK 2.1.3)	225
Earned Value Management	190
Environment (APM BoK 1.2.1)	31
Estimating	123
Governance (APM BoK 1.1)	57
Health and Safety (APM BoK 4.2)	135
Identification	220
Information Management (APM BoK 3.1.3)	114
Infrastructure (Project Office) (APM BoK 1.1.4)	19
Investment Appraisal (APM BoK 3.4.3)	110
Law (APM BoK 4.4)	131
Leadership (APM BoK 2.1.5)	80
Life Cycle (APM BoK 1.1.6)	23

Negotiation (APM BoK 2.1.6)	74
Operations Management (APM BoK 1.2.2)	35
Organisation (APM BoK 3.1.4)	5
Planning (incl. Estimating) (APM BoK 3.1.5)	119
Portfolio Management (APM BoK 1.1.3)	43
Procurement (APM BoK 3.7.3)	202
Programme Management (APM BoK 1.1.2)	38
Project Management (APM BoK 1.1.1)	49
Project Management Method	54
Project Quality Management (APM BoK 3.6)	228
Project Risk Management (APM BoK 3.5)	213
Project Sponsorship (APM BoK 1.1.8)	15
Provider Selection and Management (APM BoK 3.7.4)	208
Requirements Management (APM BoK 3.2.5)	148
Resource Management (APM BoK 3.7)	174
Resource Scheduling (APM BoK 3.3.1)	175
Reviews (APM BoK 3.6.2)	237
Risk context (APM BoK 3.5.1)	212
Risk techniques (APM BoK 3.5.2)	220
Scope Management (APM BoK 3.2)	142
Stakeholder Management (APM BoK 3.1.6)	127
Success factors and maturity (APM BoK 1.1.7)	105
Teamwork (APM BoK 2.1.7)	90
Time Scheduling (APM BoK 3.3.2)	161

Pre-course Reading Summary Exercises

PLEASE NOTE: You will receive a printed copy of these exercises and the Pre-course Reading when you attend the course. However, you may find it useful to print a hard copy of these exercises to record your answers.

The exercises are designed to help with your preparation. They do not need to be submitted before or during the course.

The exercises follow the same order as the course text, which is in-line with the Syllabus for the exam produced by APM. The course is actually delivered in a slightly different order, starting with 'Learning Outcome 4. Governance and Structured Methodologies'. From then on it follows the numeric order of the Syllabus. You may find it easier to start with section 4 in the exercises as well.

1. Structure of Organisations and Projects

1. Which of the following is NOT an example of an organisation structure?
 - A. Matrix
 - B. Project
 - C. Triangular
 - D. Functional

2. Which project document is 'owned' by the Project Sponsor?

3. What post-project activity is the Project Sponsor responsible for?

4. Which two Breakdown structures combine to form the Responsibility Assignment Matrix?

5. Who is responsible for writing the Business Case?

6. In addition to the Project Sponsor and Project Manager list four roles that may be involved in a project:


2. Project Life Cycle

1. In the APM generic project life cycle – Concept, Definition, ...?... , Handover and Closure – the missing phase is:
 - A. Development
 - B. Planning
 - C. Stakeholder Analysis
 - D. Controlling

 2. In addition to the four project life cycle phases, the extended project life cycle contains a further phase; what is it?
-

3. Project Contexts and Environment

1. Which of the following constitute a programme?
 - A. A group of otherwise unrelated projects sharing resources
 - B. A large and complex project
 - C. A group of projects sharing a common business purpose
 - D. Maintaining Business operations

 2. What six elements of a project and organisation's context are considered by a PESTLE analysis?
 - A. Political, Economic, Sociological, Technical, Legal, Environmental
 - B. Personnel, Economic, Safety, Technical, Legal, Estimating
 - C. Political, Ecological, Safety, Technical, Lifecycle, Environmental
 - D. Personnel, Ecological, Sociological, Training, Lifecycle, Estimating
- 

3. List three benefits of using Programme Management

 4. Portfolio Management takes into account what type of constraint when selecting and managing projects, programmes and business as usual?

 5. In which project phase should an analysis of Project Context first be carried out?
-

4. Governance and Structured Methodologies

1. Which of the following is a typical characteristic of a project?
 - A. Repetitive
 - B. Stable, unchanging team
 - C. Goal driven
 - D. Constant, unchanging environment

2. Which of the following is best suited to be line managed?
 - A. Building a bridge
 - B. Developing a tin-opener
 - C. Designing a new car
 - D. Manufacturing car batteries

3. Which of the following best describes the overall aim of project management?
 - A. To eliminate risk
 - B. Adhere precisely to the original specification
 - C. Ensure the original budget is met
 - D. Achieve the success criteria described in the Business Case

 4. Which of the following is an example of a method?
 - A. BS 6079-1:2000
 - B. PRINCE2
 - C. ISO 100006:1997
 - D. The APM Body of Knowledge

 5. What are the four components of 'Governance of Project Management'?
-

5. Communication

1. Which of the following is NOT a conflict resolution strategy?
 - A. Competing
 - B. Compromise
 - C. Problem-solving
 - D. Avoiding

2. Which of the following is NOT a step in a typical negotiation process?
 - A. Preparation / Planning
 - B. Proposing the offer
 - C. Contract Management
 - D. Agreement

 3. What is the first step of a negotiation process?
-

6. Leadership and Teamwork

1. Which of the following would NOT contribute to effective teamwork?
 - A. Setting and agreeing clear team objectives
 - B. Micro-management
 - C. Clear and open communication
 - D. Ensuring support and trust amongst team members

2. Which of the following could be thought of as a 'Hygiene Factor'?
 - A. Professional achievement
 - B. Professional recognition
 - C. Responsibility
 - D. Nice working conditions

3. Which of the following would be a principle of an effective leader?
 - A. Ability to adapt their leadership style to different situations
 - B. Being autocratic/dictatorial
 - C. Letting the team lead themselves
 - D. Arranging team building sessions

4. What does Maslow say about 'a satisfied need'?


 5. A 'leader' is engaging with a very experienced, engaged and confident member of their team. In which sector of the Skill/Will model are they likely to be?

 6. What is the final stage of the Tuckman Team Development model?

 7. Which Belbin role type has characteristics such as 'extrovert; highly motivated; strongly driven'?
-

7. Planning for Success

1. Success criteria should be developed as part of:
 - A. Detailed planning
 - B. The Work Breakdown Structure
 - C. The Business Case
 - D. Risk Management

 2. A Project Management Plan:
 - A. Is sometimes called a Gantt Chart
 - B. Excludes procurement
 - C. Includes the 'What', 'Why', 'How', 'When', 'How Much', and 'Who' of the project
 - D. Is developed by the Sponsor
- 

3. Which of the following is NOT an estimating method?
 - A. Parametric
 - B. Weighted index
 - C. Bottom-up
 - D. Comparative

4. Estimates are most likely to be exceeded if:
 - A. There are uncontrolled changes
 - B. There are changes in project personnel
 - C. There are no quality assurance functions
 - D. There is an unsatisfactory cash flow.

5. Which of the following is NOT typically a heading in a project's Business Case?
 - A. Benefits
 - B. Investment Appraisal
 - C. Project Management Team
 - D. Options considered

6. Which of the following would be more associated with the Business Case rather than the Project Management Plan?
 - A. Milestones
 - B. Project benefits
 - C. Document distribution schedule
 - D. Reference to standards

7. An Investment Appraisal provides:
 - A. A consistent, structured approach to investment decision making
 - B. The timing of significant purchases
 - C. The cost of product maintenance
 - D. A sound base for creating the Project Management Plan

8. Around which three things do Project Success Criteria normally revolve?

15. Which is the most simplistic investment appraisal technique?


8. Scope Management

1. Why are Product Breakdown Structures developed?
 - A. They identify everything the project must create or produce
 - B. They identify the resource requirements for the project
 - C. They detail the order in which the products must be delivered
 - D. They identify the skills required for the creation of the products

 2. Change Control:
 - A. Is only applicable to projects with physical deliverables
 - B. Must be applied on all projects
 - C. Is not cost effective on small projects
 - D. Is the responsibility of the Business Sponsor

 3. Configuration Management:
 - A. Is applicable to all projects
 - B. Is applicable only when projects have tangible products
 - C. Is only relevant to programmes, not to projects
 - D. Is applicable only to project documentation

 4. Configuration Management is the responsibility of:
 - A. The individuals of the team
 - B. The Client
 - C. The Project Manager
 - D. The Operations Manager

 5. What will help in the ultimate acceptance of the project?
 - A. Identifying risks associated with a plan
 - B. Agreeing the requirements with the user
 - C. Establishing tolerance levels
 - D. Follow-on Action Recommendations
- 

10. Procurement


1. The pricing method most likely to be used when clearly defined goods are procured is:
 - A. Fixed price
 - B. Cost Reimbursement
 - C. Maximum price
 - D. Target price

 2. Which of the following is part of a Procurement strategy?
 - A. Use of Discounted cash flow
 - B. Pareto Analysis
 - C. Application of an Ansoff matrix
 - D. Decision to use Competitive tendering

 3. Which term of payment offers most risk to the supplier?
-

11. Project Risk Management and Issue Management

1. Which of the following is a strategy for responding to a risk?
 - A. Reduction
 - B. Smoothing
 - C. Assessment
 - D. Identification

 2. Which of the following is a correct and complete definition of a project risk?
 - A. An event which causes uncertainty
 - B. An uncertainty which if it occurs would affect one or more project objectives
 - C. A threat to human health and safety
 - D. The impact of changes in requirement
- 

3. You should not delegate if:
 - A. You could do the job better yourself
 - B. It would be quicker if you did it yourself
 - C. The task has been specifically delegated to you
 - D. You particularly like this type of work

 4. What are the elements of the Risk Management Process?
-

12. Project Quality Management

1. Which techniques make up Project Quality Management?
 - A. Quality Planning, Project Assurance, Quality Control, Continuous Improvement
 - B. Quality Assurance, Quality Audit, Quality Control, Continuous Improvement
 - C. Quality Planning, Quality Assurance, Quality Control, Continuous Improvement
 - D. Quality Assurance, Quality Planning, Quality Audit, Continuous Improvement

2. When is a Benefits Realisation review held?
 - A. When a measurement of the achievement of the benefits can be made
 - B. Six months after project closure
 - C. When the project starts making a return on its investment
 - D. When the first problem is encountered in operational use

3. What is a 'broad definition' of Quality in a project?

4. What type of project review would be held at regular intervals throughout a phase?

5. In which phase is the Post-Project Review carried out?

Summary Exercise Answers

1. Structure of Organisations and Projects	
1	C
2	The Business Case
3	Benefits realisation
4	The Work Breakdown Structure (WBS) and Organisation Breakdown Structure
5	The Sponsor, usually with the impact of others including the user(s), project manager and subject matter experts.
6	<p>The core roles are:</p> <ul style="list-style-type: none"> ◦ User (or Customer) ◦ Supplier ◦ Project Office (Administrative Support) ◦ Project Team ◦ Assurance <p>Other roles can include:</p> <ul style="list-style-type: none"> ◦ Procurement Manager ◦ Configuration Librarian ◦ Project Accountant ◦ Project Planner

2. Project Life Cycle	
1	Development
2	<p>The 'Benefits Realisation phase.</p> <p>The Extended Product Life Cycle also includes the 'Operation' and 'Termination' phases.</p>

3. Project Contexts and Environment	
1	C
2	A
3	<p>There are a number of in a number of areas including:</p> <ul style="list-style-type: none"> ◦ Benefits Management ◦ Transition Management ◦ Resource Management ◦ Strategic Change ◦ Consistency of Approach ◦ Management of Project Interdependencies ◦ Governance.
4	Resource constraints.
5	The Concept phase

4. Governance and Structured Methodologies	
1	C
2	D
3	D
4	B
5	<ul style="list-style-type: none"> ◦ Portfolio Direction ◦ Project Sponsorship ◦ Project Management ◦ Disclosure and Reporting

5. Communication	
1	C
2	C
3	Preparation

6. Leadership and Teamwork	
1	B
2	D
3	A
4	A 'satisfied need' ceases to motivate. Once the need is met having more of it will not lead to more satisfaction.
5	'Delegate'
6	'Adjourning'
7	'Shaper'

7. Planning for Success	
1	C
2	C
3	B
4	A
5	C
6	B

7	A
8	Time, Cost and Quality.
9	The Project Manager.
10	Definition.
11.	<ul style="list-style-type: none"> ◦ Collect, ◦ Store ◦ Disseminate ◦ Archive ◦ Destroy
12.	$\frac{O + (4xML) + P}{6}$
13.	It provides the justification for undertaking the project.
14.	Costs and Benefits (or income and expenditure).
15.	Payback.

8. Scope Management

1	A
2	B
3	A
4	C
5	B
6	<ul style="list-style-type: none"> ◦ Capture ◦ Analysis ◦ Test

7	<ul style="list-style-type: none"> ◦ Plan ◦ Identify ◦ Control ◦ Status accounting ◦ Verify (also referred to as Audit)
8	Bottom-up estimating
9	The user(s)

9. Schedule and Resource Management	
1	D
2	B
3	C
4	Also 20 days.
5	Smoothing
6	<ul style="list-style-type: none"> ◦ Planned Cost (PC) ◦ Actual Cost (AC) ◦ Earned Value (EV)

10. Procurement	
1	A
2	D
3	Firm Fixed Price

11. Project Risk Management and Issue Management	
1	A
2	B
3	C
4	<ul style="list-style-type: none"> ◦ Initiate ◦ Plan ◦ Identify ◦ Assess response ◦ Implement response

12. Project Quality Management	
1	C
2	A
3	Fitness for purpose or the degree of conformance of the outputs of a process or the process itself.
4	Project evaluation reviews
5	The Closure stage of the Handover and Closure phase.

Blank page.

Additional Pre-Course Exercises

Exercise: Risk Identification

Determine which risk identification technique is being applied in each of the following scenarios:

Scenario	Risk Identification Technique
You meet individually with key stakeholders to ask questions regarding possible risks on the project	
You perform a PESTLE analysis to help identify some of the external factors that might influence your project	
You send a list of project questions to a select group of stakeholders, then repeat this exercise until a consensus is reached	
You review your estimates and voice concern whether last year's mild winter will be repeated this coming year	
You gather together subject matter experts along with your main supplier to identify the key risks in your new construction project	
An extremely complex risk forces you to first cluster the risks, before trying to find the root cause of the potential effect	
You analyse the internal and external factors that may influence this project	

Exercise: Risk Responses

Determine which response strategy is being applied in each of the following scenarios (threat or opportunity).

Note: If Reduce or Enhance is chosen as your strategy, please state whether 'probability' and/or 'impact' is mainly being addressed.

Scenario	Threat / Opportunity	Risk Response
Move all cabling work to a date where a less expensive contractor is available to undertake the contract		
Increase the staff training to ensure appropriate competence levels are achieved		
Due to a lack of suitably qualified software engineers, the project scope is changed to remove the software work package		
Appoint consultants to aid with the definition and implementation of improved business processes		
Insist on a fixed price contract in order to 'guarantee' the project budget		
Use your procurement group to negotiate a better deal for the equipment purchase		
Increase the system testing to minimize potential bugs during the commissioning phase of the project		
Monitor the day-rate of electrical contractors in case there is the opportunity for cheaper labour		

Exercise Answer: Risk Identification

Scenario	Risk Identification Technique
You meet individually with key stakeholders to ask questions regarding possible risks on the project	Interviews
You perform a PESTLE analysis to help identify some of the external factors that might influence your project	Prompt List
You send a list of project questions to a select group of stakeholders, then repeat this exercise until a consensus is reached	Delphi Technique
You review your estimates and voice concern whether last year's mild winter will be repeated this coming year	Assumptions Analysis
You gather together subject matter experts along with your main supplier to identify the key risks in your new construction project	Brainstorming
An extremely complex risk forces you to first cluster the risks, before trying to find the root cause of the potential effect	Cause and Effect Diagram
You analyse the internal and external factors that may influence this project	SWOT Analysis

Exercise Answer: Risk Response

Scenario	Threat / Opportunity	Risk Response
Move all cabling work to a date where a less expensive contractor is available to undertake the contract	O	Exploit
Increase the staff training to ensure appropriate competence levels are achieved	T	Reduce (Probability)
Due to a lack of suitably qualified software engineers, the project scope is changed to remove the software work package	T	Avoid
Appoint consultants to aid with the definition and implementation of improved business processes	O or T	Share Reduce?
Insist on a fixed price contract in order to 'guarantee' the project budget	T	Transfer
Use your procurement group to try and negotiate a better deal for the equipment purchase	O	Enhance (Probability) or Exploit?
Increase the system testing to minimize potential bugs during the commissioning phase of the project	T	Reduce (Impact)
Monitor the day-rate of electrical contractors in case there is the opportunity for cheaper labour	O	Reject

Exercise: Quality – Tools and Processes

Determine which quality tool is being used in each scenario and whether this activity belongs to Quality Planning, Quality Control, Quality Assurance or Continuous Improvement.

Scenario	Quality Tool / Technique	Quality Management Process
Inspect 10 components out of every 100 produced instead of all of them		
Analyse a chart to determine which problems are causing the highest percentage of failures in the process in order to determine possible improvements		
Creating a tally of the number of single occurrences of a specific component failing within a manufacturing process		
Agreeing the acceptable upper and lower variance thresholds with the customer		
Clustering the main sources of a possible defect before looking at the individual factors within each source		
Plotting the frequency of different software bugs on a diagram		
Analysing the link between the age of equipment and the number of faulty parts produced		
Assess the new product introduction process to ensure that it is being followed correctly and consistently		

Exercise Answer: Quality – Tools and Processes

Determine which quality tool is being used in each scenario and whether this activity belongs to Quality Planning, Quality Control, Quality Assurance or Continuous Improvement.

Scenario	Quality Tool / Technique	Quality Management Process
Inspect 10 components out of every 100 produced instead of all of them	Statistical (Acceptance) Sampling	Quality Control
Analyse a chart to determine which problems are causing the highest percentage of failures in the process in order to determine possible improvements	Pareto Chart	Quality Assurance
Creating a tally of the number of single occurrences of a specific component failing within a manufacturing process	Check sheet	Quality Control
Agreeing the acceptable upper and lower variance thresholds with the customer	Control Chart	Quality Planning
Clustering the main sources of a possible defect before looking at the individual factors within each source	Cause and Effect	Quality Assurance
Plotting the frequency of different software bugs on a diagram	Histogram	Quality Control
Analysing the link between the age of equipment and the number of faulty parts produced	Scatter Diagram	Quality Control
Assess the new product introduction process to ensure that it is being followed correctly and consistently	Audit	Quality Assurance

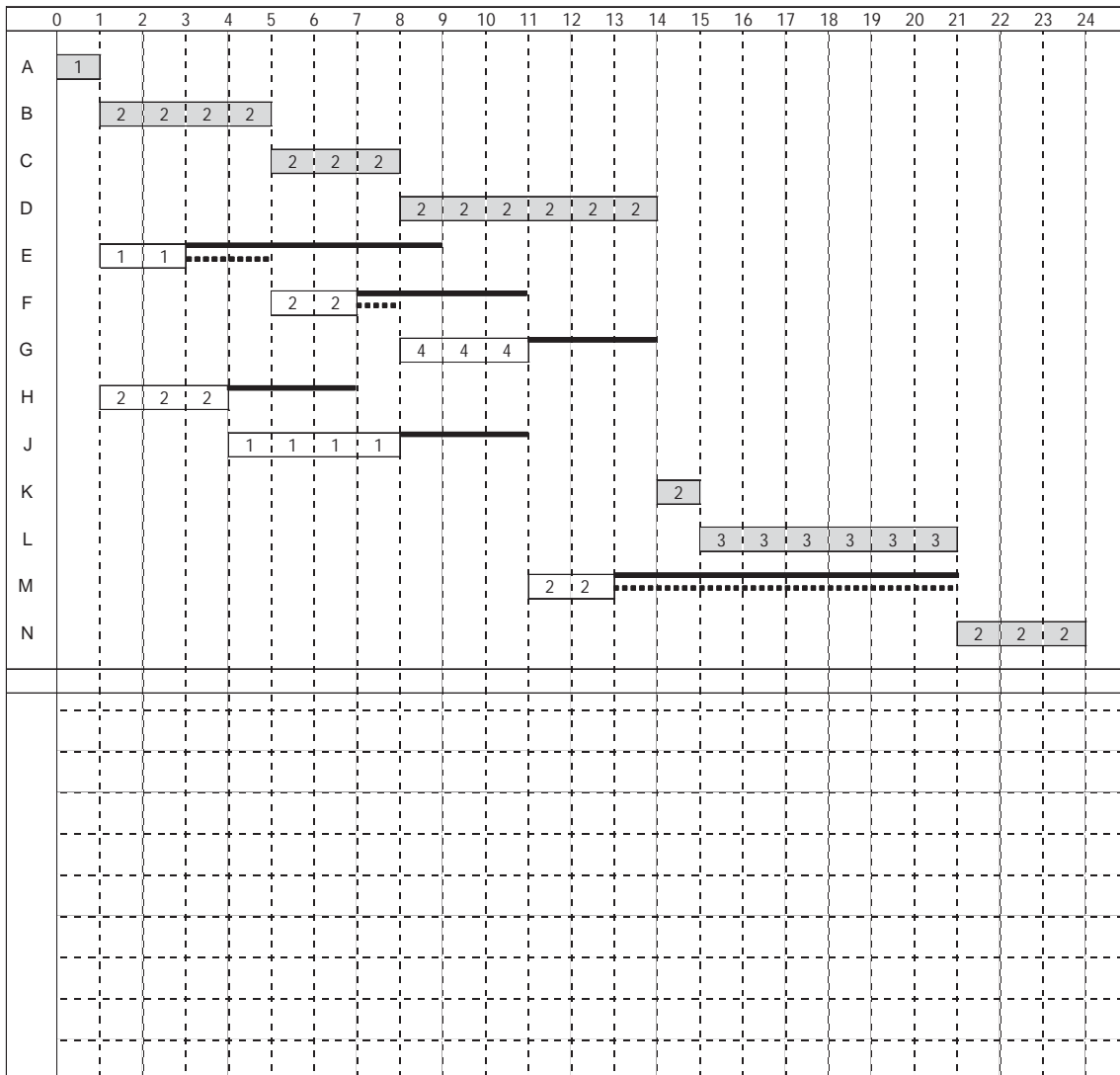
Blank page.

Exercise: Resource Management

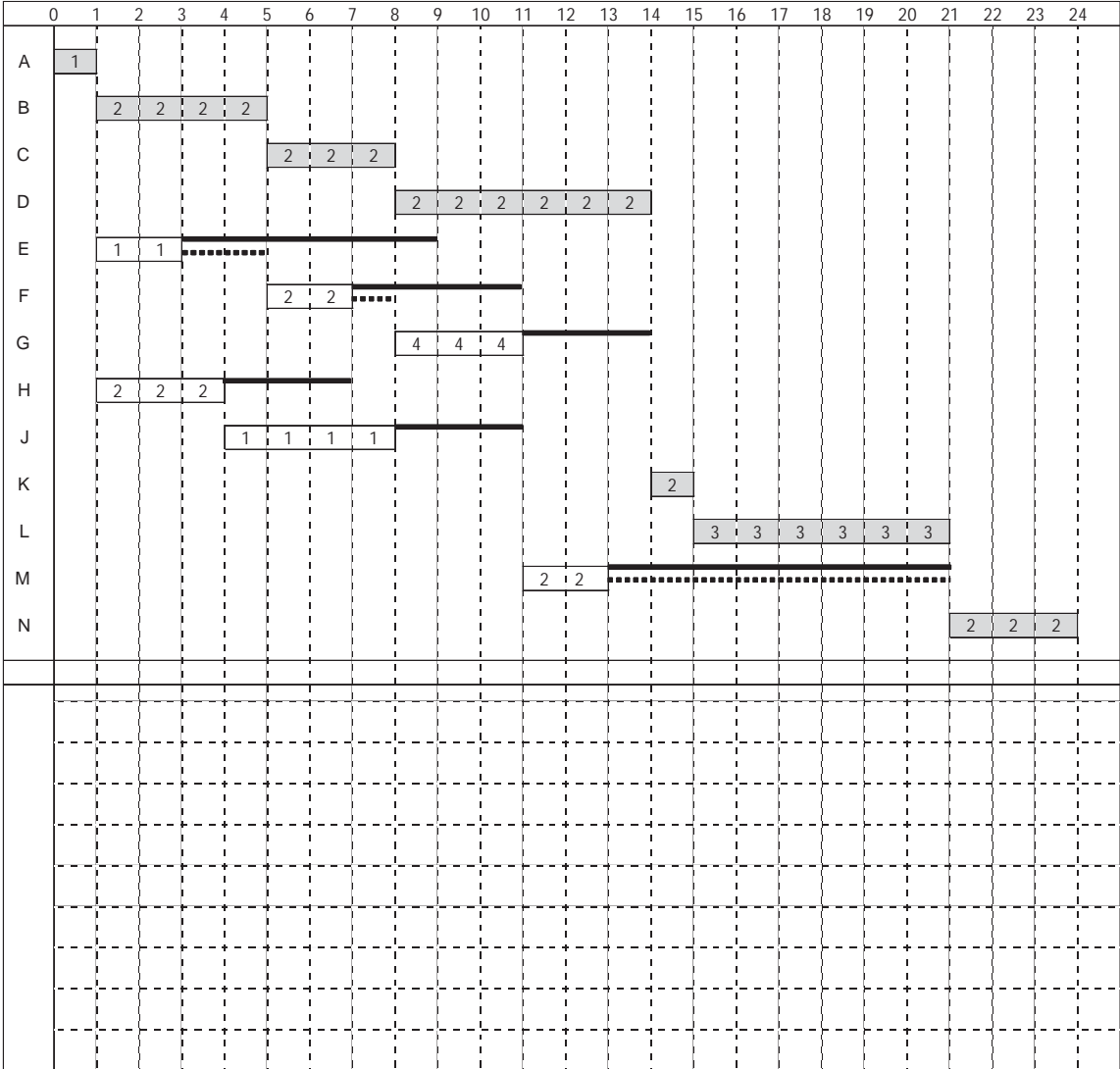
Using the two Gantt charts below, complete the following:

1. Resource histogram
2. Resource 'S' curve
3. Explain what would happen if a constraint of five resources maximum was placed on the project?
4. Explain how can this constraint be satisfied without affecting the end date? You do not have to re-draw the Gantt, only comment.

1. Resource Histogram



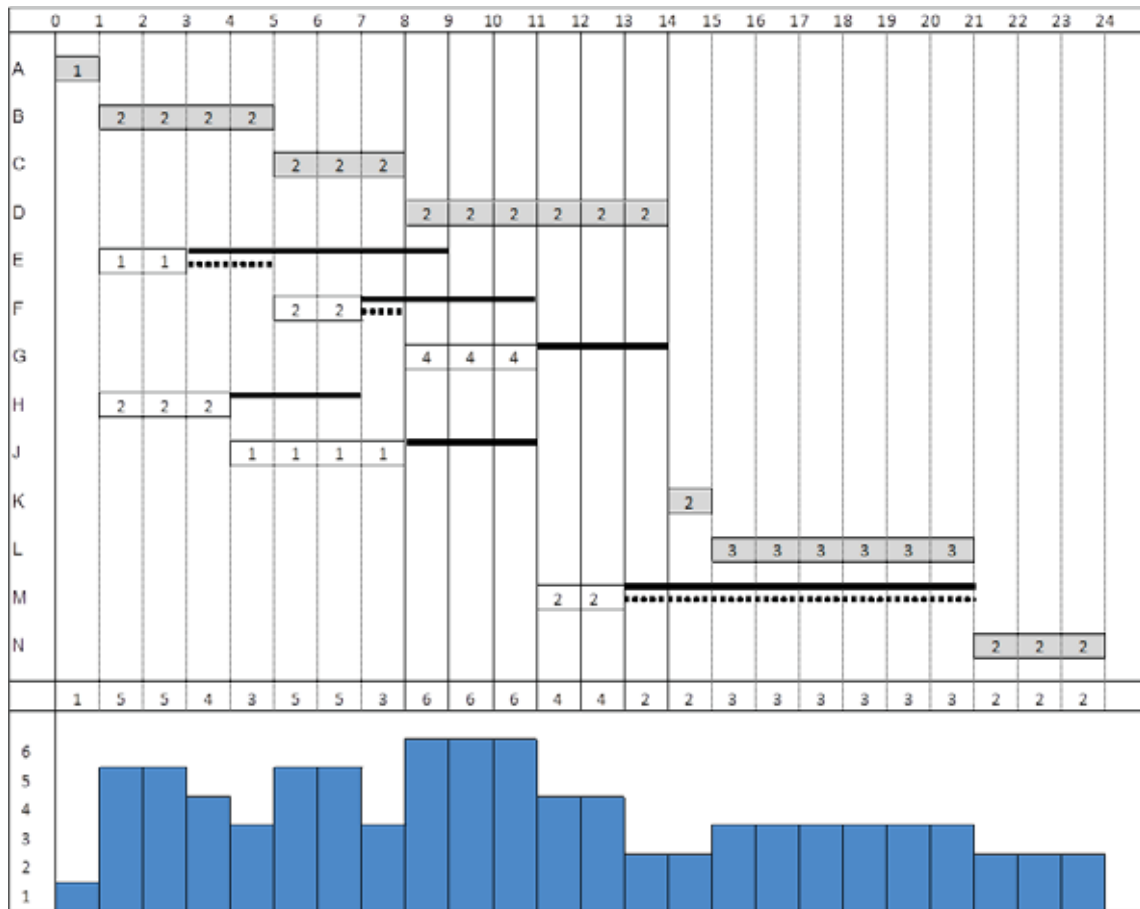
2) S-Curve

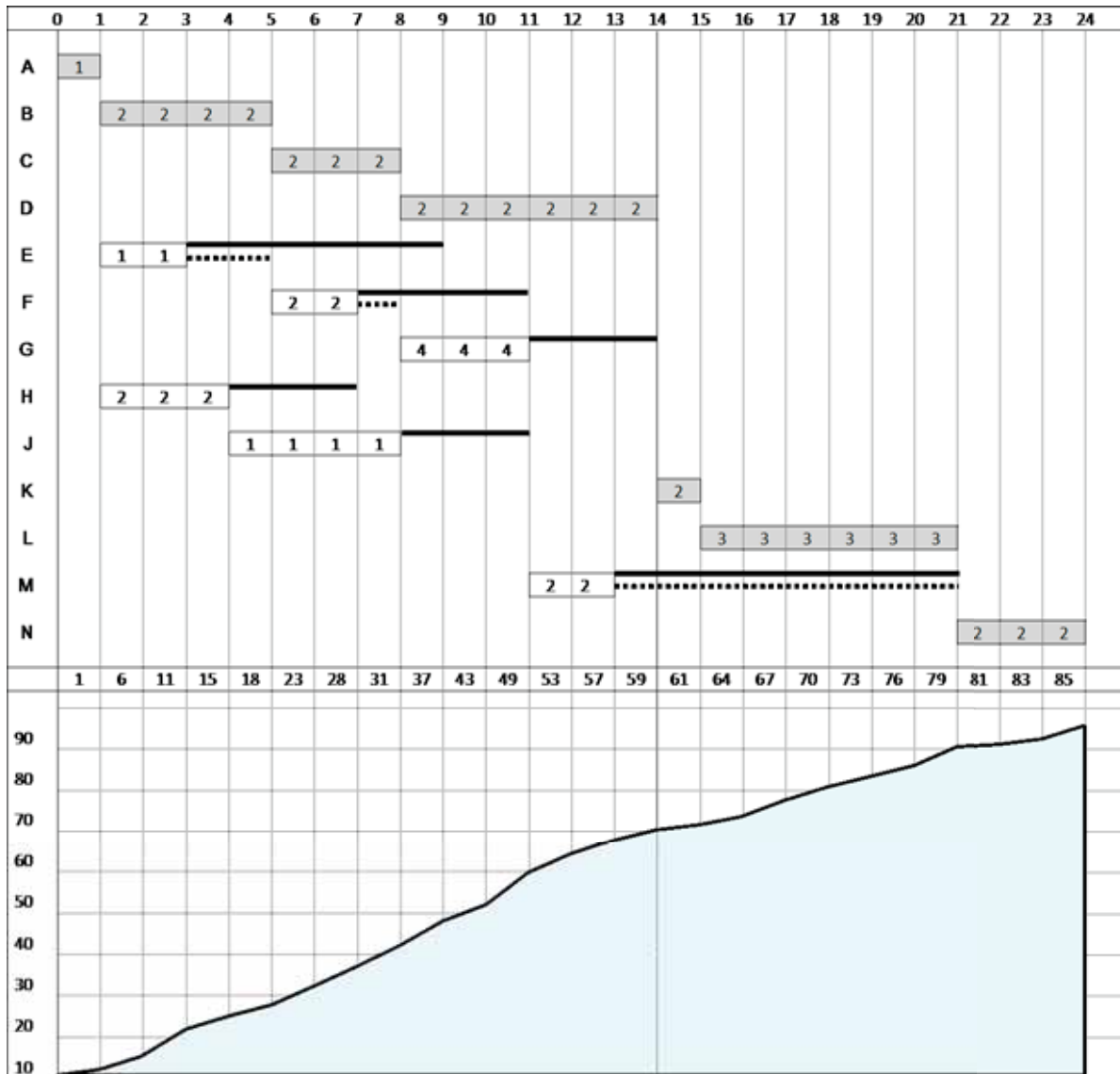


3)

4)

Exercise Answers: Resource Management





- 3) A resource constraint of five would result in a delay to either task D or G first. Delaying either task would have an impact on subsequent tasks and result in a delay to the project. If task D was delayed the project would overrun by three days.
- 4) The constraint could be satisfied by carrying out the following actions:
 - delay the start of M by three days using the float available
 - reduce resources on G to two (assuming the work type permits this) and double the duration; typically a less acceptable solution as would be splitting any activities.

(Other solutions are also available.)

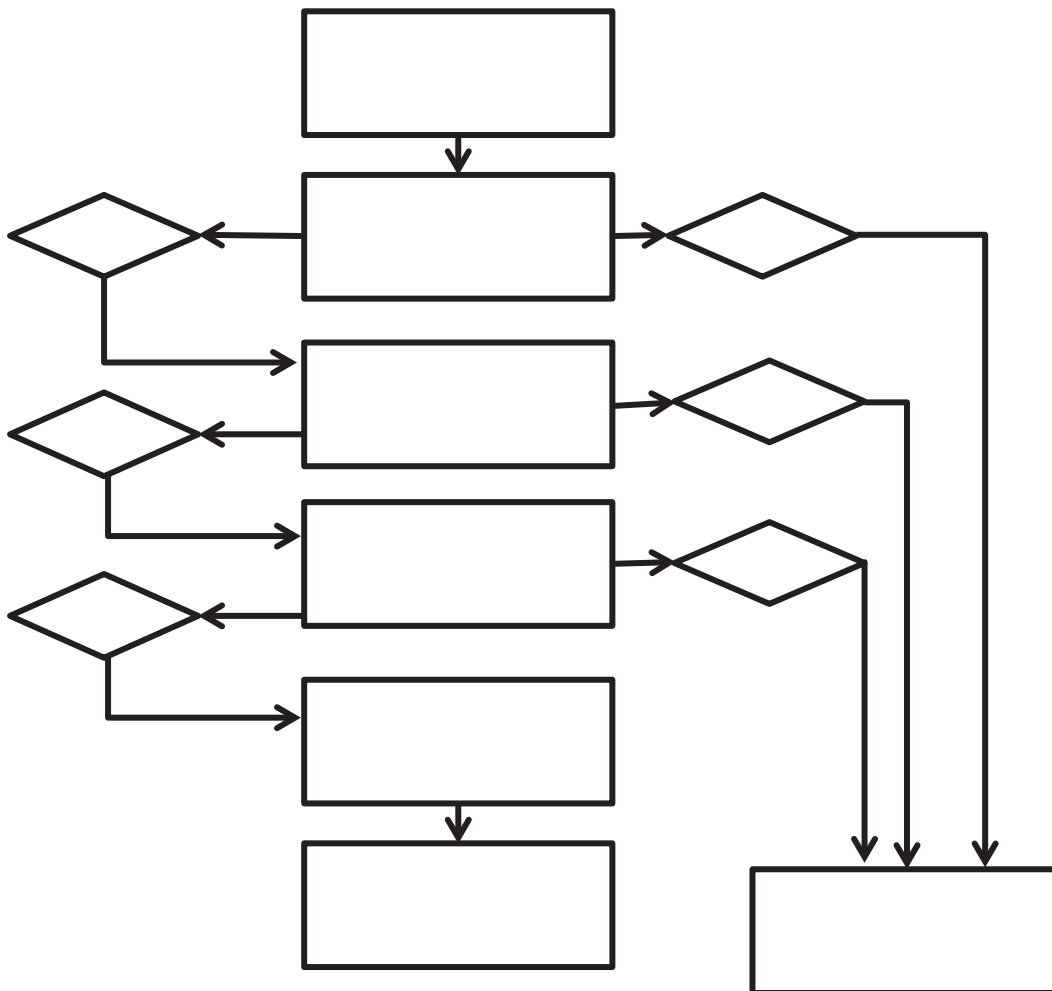
Blank page.

Exercise: Change Control Process

Place the following 'elements' into the appropriate boxes in order to create a change control process.

Recommendation	Update plans	Initial evaluation
Change request	Inform requestor	Implement
Yes*	Detailed evaluation	No*

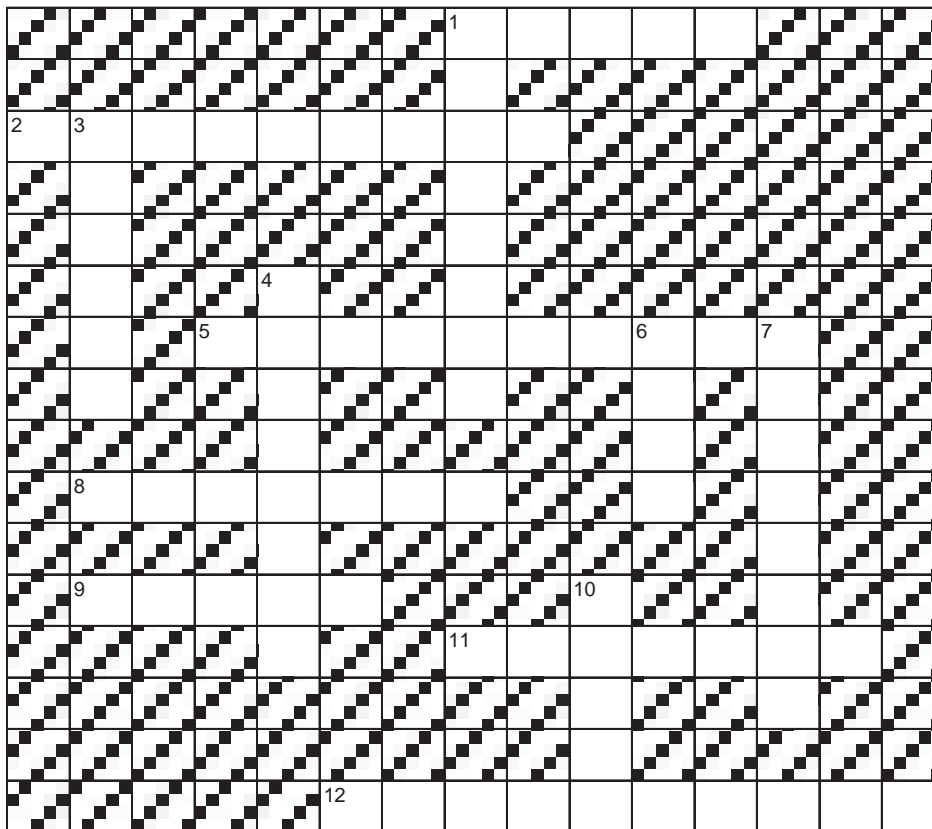
*These appear more than once



Exercise Answer: Change Control Process

See classroom slides for answer.

Exercise: Procurement Crossword



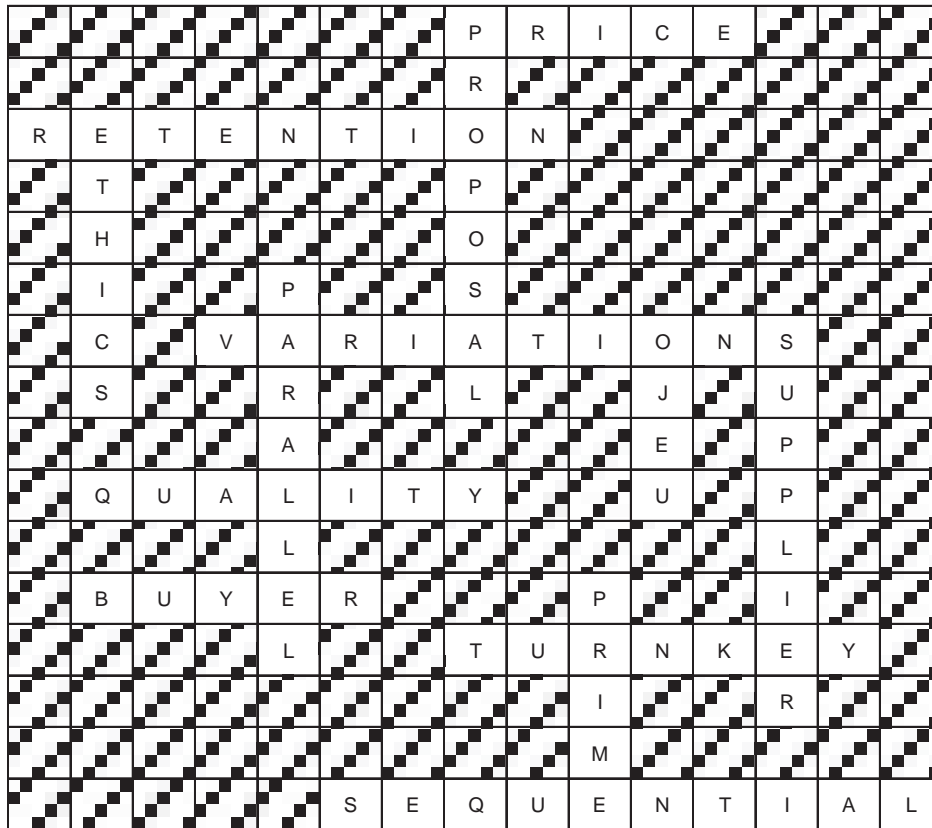
Across

1. Key factor when choosing a supplier
2. Provides customer with funds to pay for rectifying defects
5. May cause a significant threat to the project objectives if not managed correctly
8. May be at risk in incentive contracts if not managed appropriately
9. Assumes the most risk in a cost-reimbursable pricing relationship
11. Another name for a Comprehensive contract
12. Contract that might be used when the project scope is unclear and will be validated throughout the project

Down

1. Customer may issue a 'Request for ...' when soliciting for suppliers
3. May play a significant part in an organisation's procurement policies
4. Contract type where the customer manages the supplier interfaces
6. Legislation that determines procurement process on government projects in the EU
7. Owns the 'cost-risk on Fixed Price contracts
10. The main supplier interface with the customer in a sub-contract relationship

Exercise Answer: Procurement Crossword



Across

- 1. Key factor when choosing a supplier
- 2. Provides customer with funds to pay for rectifying defects
- 5. May cause a significant threat to the project objectives if not managed correctly
- 8. May be at risk in incentive contracts if not managed appropriately
- 9. Assumes the most risk in a cost-reimbursable pricing relationship
- 11. Another name for a Comprehensive contract
- 12. Contract that might be used when the project scope is unclear and will be validated throughout the project

Down

- 1. Customer may issue a 'Request for ...' when soliciting for suppliers
- 3. May play a significant part in an organisation's procurement policies
- 4. Contract type where the customer manages the supplier interfaces
- 6. Legislation that determines procurement process on government projects in the EU
- 7. Owns the 'cost-risk on Fixed Price contracts
- 10. The main supplier interface with the customer in a sub-contract relationship

Exam Hints and Tips

It is good to remember that there is a technique to sitting an exam. Those who regularly take exams already know this. Those who have not taken exams for some time need a reminder.

Before we start, here is some advice that will always help – HAVE A POSITIVE MENTAL ATTITUDE!

The APMP Guide for Candidates – if you do not have a copy you should download a copy from the APM website: www.apm.org.uk/qualifications – refers to the type of question that may be posed in the examination questions and what the APM will be looking for in your answer. Although the APM guidelines indicate the minimum requirement for a successful answer, our experience is that delegates need to provide a little more detail in order to demonstrate understanding of the key concepts and the potential to be able to apply them to a real project.

Exam Question Meanings

<p>State</p>	<p>What the ‘APMP Guide for Candidates’ writes:</p> <p>A coherent single sentence that answers the question, as posed.</p> <p>What you should provide:</p> <p>A simple statement of what something is: e.g. ‘State four characteristics of a business case’</p> <ul style="list-style-type: none"> ◦ It describes the problem or opportunity presented allowing an appropriate solution to be identified ◦ It identifies the business benefits which may include hard benefits (for example, increased profit) and soft benefits (for example, brand awareness) ◦ It is used to record current project assumptions which can then be validated by the relevant stakeholders ◦ It lists the success criteria for the project which are often related to time, cost and quality targets.
<p>List and Describe</p>	<p>What the ‘APMP Guide for Candidates’ writes:</p> <p>A list of words or phrases with a clear description of what is understood by words or phrases listed.</p> <p>Each description requires a short paragraph made up of 2 or more sentences.</p> <p>In answering a List and describe question, a candidate may choose to:</p> <ul style="list-style-type: none"> ◦ List the number of points needed first and then describe them in separate paragraphs <p>or</p> <ul style="list-style-type: none"> ◦ Use clearly defined sub-headings in the text to indicate the points listed. <p>What you should provide:</p> <p>For the ‘List’ part: a simple bulleted or numbered list of one to a few words (like a shopping list). The list must be brief and to the point.</p> <p>For the ‘Describe’ part: a paragraph per point being made. Each paragraph to consist of two or more sentences, probably of five or six lines of text in coherent complete sentences.</p>

	<p>Use 'Why, what, when, who, where, what-if, strength / weakness' as prompts to help expand the point being made.</p> <p><i>e.g. List and describe one of the Scope Management breakdown structures:</i></p> <p><u>Work Breakdown Structure</u></p> <p><i>Dividing the scope of the project into manageable pieces of work is a fundamental aspect of effective project planning and hence project management. This process allows the scope of the project to be fully defined. The work breakdown structure as an output of this process is a task oriented breakdown of the project, which defines all the work packages to be completed in order for the project to fully comply with the agreed scope.</i></p>
<p>Explain</p>	<p>What the 'Guide for Candidates writes:</p> <p>An explanation making clear the meaning and relevance of an idea or concept. Each point requires a paragraph made up of 2 or more sentences. It may be appropriate to provide examples or diagrams to clarify the explanation. If there are specific marks for examples or diagrams this will be explicitly stated in the question.</p> <p>What you should provide:</p> <p>A paragraph per point being made. Each paragraph to consist of two or more sentences, probably of five or six lines of text in coherent complete sentences.</p> <p>Use 'Why, what, when, who, where, what-if, strength / weakness' as prompts to help expand the point being made, providing an example if relevant.</p> <p><i>e.g. Explain the Work Breakdown Structure:</i></p> <p><i>Dividing the scope of the project into manageable pieces of work is a fundamental aspect of effective project planning and hence project management. This is achieved by producing a scope definition – through requirements capture – and then breaking the agreed project scope into more detail until reaching work package level. An example might be the scope definition of a building where individual rooms and facilities are defined in increasing levels of detail, thereby providing a basis for the time and cost planning of the project. Why, what, when, who, where, what-if, how, strength / weakness, provide an example if relevant</i></p>

Exam Technique

Your first decision is how long to spend on each question. Allow for some time at the start to read and annotate all the questions and select the ones that you are definitely going to answer and those you are not. Then allow for some time at the end to check your answer(s) or add additional thoughts.

From three hours (180 minutes), if you assume 15 minutes reading time and 15 minutes checking time, that leaves 150 minutes or 15 minutes per question. Remember this figure.

At the start of the exam, read all parts of all the questions very carefully. Choose the ten you feel most confident in answering well. There are 46 examinable areas, of which 16 will be used in the paper.

When approaching the written questions, pay careful attention to the time, **SPEND YOUR ALLOTTED TIME AND NO LONGER**. Stop at the end of this time, and go on to the next question. If you still have more to write, then go back to it at the end.

You must use a new sheet of paper for each question. Leave space at the bottom of each section to add additional points later.

When there is an opportunity to draw a diagram, do so. The examiners like to see them, and they help to demonstrate knowledge of a subject.

Answer each question, by firstly summarising the question (do not waste time repeating the whole question). For example:

- Q: Describe the content of a project management plan that may be used to help manage your specific project.
- A: The content of the project management plan includes the following:

Clearly show your list of five specific points (for example in a bulleted list and/or in block capitals at the start of each section).

Make sure you answer ten questions and all parts of each question. Use the time at the end to read through all your answers and add additional comments. If time is running out and you think of an additional point, bullet it.

FINALLY, KEEP WRITING AND ADDING ADDITIONAL INFORMATION TO ALL YOUR ANSWERS UNTIL THE TIME RUNS OUT. You never know how it may help.

Ensure you return the Question Paper to the Invigilator in its envelope prior to finally leaving the examination room. If you fail to do this, the APM will **NOT** mark your papers. There are no exceptions to this rule.

Common Exam Issues

It is useful to identify areas where exam candidates often have problems in exams. Knowledge of these areas will hopefully prevent you from making similar mistakes.

Not answering the question that has been set

This might include misinterpreting one of the key words in the question. It is also very important that you answer all parts of the question. For example – “List five parts of the Project Management Plan and describe the relevance of each to a successful project” asks the candidate to list five then a description of each is required. There are two ways in which this can be done. (Look at the ‘APMP Guide for Candidates’ booklet for more detail or ask your course tutor.) It is a very useful technique to go back and read the question again at the start of each section of your answer.

Not Referencing Course / Academic Concepts

The primary purpose of the exam is to demonstrate that you understand the topic areas covered by the syllabus. If your answer does not call explicitly upon course concepts then you may want to carefully consider whether you have correctly understood what is being asked for. It is also important that you show that you understand course concepts by using appropriate examples.

Poor Time Management

It is much easier to achieve marks in the lower range of the marks scale than it is in the higher range. Candidates who spend significant time trying to achieve a „perfect“ answer are likely to be disappointed as one is unlikely to exist. Candidates should apportion time equally on each question and on each part of a question.

Poor Presentation or Structure

Answers should be clearly structured with an introduction that indicates what is going to be discussed. Diagrams and writing should be legible and paragraphs / sections should be clearly titled and divided.

Next Steps

Whatever the outcome of the exam, it is important that we look for opportunities to reinforce the learning through application in the workplace. In the unlikely event of not being successful in the exam (remember that significantly more people pass than fail!) then we need to constructively review how we both performed and prepared for the exam. Remember that there are people who can help you in this process!

Further Help

The Open University is one of a number of institutions that provides excellent resources for helping people with Study Skills.

Manager's Good Study Guide (2007) Tyler, S., The Open University, 3rd Ed

<http://openlearn.open.ac.uk/course> (Open University Open Learning Space - course number LDT101_1)

APMP ANSWERS – TYPICAL STRUCTURE

Delegates often have an issue trying to demonstrate their knowledge in the time available. Although not suitable for all questions, you may find the following examples useful in order to provide guidance on how to structure answers.

“Explain five benefits of a (formal project management method)”

Here is an example answer for one benefit.

	Sample Answer
Point (1 of 5)	Consistent management of projects
What is being done (and how)	A formal project management method ensures that projects follow a similar life cycle and also adopt a consistent method of project reporting.
Why is this being done	This consistency allows team-members to better integrate if working in cross-site or cross-functional teams due to the fact that a common language is being used.
What happens if it is not done	If project teams are allowed to use their own method then this is likely to be inefficient and also cause problems for our governance of projects.
(Workplace) example	MYCO has created a standard project management manual and has trained staff in the adoption of this method. The manual includes our standard life cycle which defines the project phases and key deliverables.

“Explain five responsibilities of the (Project Office)”

Here is an example answer for one responsibility

	Sample Answer
Point (1 of 5)	Assignment and Development of Project Managers
What is being done (and how)	The Project Office (PMO) may select project managers for specific projects based on factors such as current workload

	and/or technical capability.
Why is this being done	This ensures that project managers are a good fit for their respective projects and also that development needs are identified and addressed.
What happens if it is not done	Poor selection of project managers may lead to a lack of credibility between the project manager and the team – or worse, the client.
(Workplace) example	MYCO has a competency-based development programme for its project management community that has been created and managed by our PMO.

“Explain five (project estimating) techniques”

Here is an example answer for one technique

	Sample Answer
Point (1 of 5)	Comparative Estimating
What is being done (and how)	A comparative estimate uses data from previous projects (mainly time and cost) to create an approximation for future projects. The estimate may be scaled up or down to accommodate differences in the size of the project being undertaken.
Strength of Technique	Comparative estimates can be very quick to generate and help to provide an immediate validation of a project’s viability.
Weakness of Technique	However comparative estimates must be based on accurate data and significant similarities between projects should exist; failure to do so can result in very poor decisions being made.
(Workplace) example	Using the scaling process described above, MYCO uses comparative estimating during our tendering process in order to decide whether we should bid for work.

Example Answers (Good and Bad)

Question

List five features of an effective team and describe what actions the project manager might take to ensure these features are in place for the project.

The requirements from APM for the answer to a 'List and Describe' question are:

Where a single question asks for a candidate to 'List and Describe' candidates should either:

- *List the number of points needed first and then describe them in a separate paragraph*

or

- *Use clearly defined sub-headings in the text to indicate the points listed.*

Answer ('good' answer)

1. All team members understand their role

It is important to define roles early in the project (e.g. Definition phase) to help minimise conflict and ensure that work is not duplicated and / or gaps in activities are not present. The Project Manager (PM) might create a Responsibility Assignment Matrix (RAM) that details who is Responsible, Accountable, Consulted and Informed (RACI) about key project deliverables. The PM may also create task sheets or job-descriptions for certain roles and discussing these to ensure that each member understands and agrees what their role shall entail.

2. Team communicates effectively

The PM must make sure that appropriate mechanisms are in place to distribute information and obtain feedback so that a common understanding can be confirmed. The PM could create a formal Communication Plan detailing who shall send information, who receives it, timings, the appropriate medium to be used, desired reaction etc. Other actions might include regular briefings (e.g. status meetings, conference calls, status reports etc.). It may also be useful to create a web page where information might be stored and made easily accessible to the relevant stakeholders.

3. Team understands the objectives

Talking the team through the project's Business Case would be an excellent way to make sure that the team understands the overall project objective and secure their commitment. It is also necessary to define and agree SMART (specific, measurable, achievable, relevant and time-bound) objectives for each team member and show how

these contribute to the project and client objectives. These can then form the basis of an objective review of individual and team performance.

4. Team is motivated

The PM must ensure that individual goals and desires are understood in order that actions are in place to satisfy these goals where possible. Team members should receive regular constructive feedback on performance with development opportunities being agreed and acted upon. Appropriate recognition of performance should be maintained throughout and reward systems seen to be equitable. This might mean that the PM has the opportunity to provide financial rewards, influence career progression (e.g. promotion or future project work etc.).

5. Team respects the leader and strives to support the leader

The PM must clearly communicate the vision for the project both from a technical and business perspective (e.g. communication of technical requirements, presentation of Business Case etc.). This will help secure team commitment. The PM might employ a number of leadership styles depending on the nature of the task and the maturity of the team. For example, junior team members might need very specific and detailed instruction concerning project tasks whereas more experienced staff might benefit from having more say in how project work is planned and undertaken.

Commentary

The answer above is very clearly structured with each paragraph having a clear heading to relate it to the list. This makes sure you always get the 15 points for the list. Alternatively you can put a numbered list first and then number each paragraph correspondingly. That way if you do run out of time you have at least shown the examiner you know five points as requested in the question.

Each section clearly expands on why this factor is important to teams before then listing a number of specific actions that may be undertaken by the project manager, thereby ensuring that both parts of the question (list and describe) are addressed. Each action has been linked back to the feature of the effective team by discussing the relevance of each individual action.

All parts of the question have been attempted and the length of each section is roughly equal in terms of the depth of description.

Answer ('poor' answer)

1. It is important to define each team member's role and responsibilities as early as possible in the project (e.g. the Definition phase). This will help prevent conflict between team members and ensure that work is not duplicated and / or gaps in activities are not present. Conflict and duplication is likely to have a detrimental impact to the time, cost and quality objectives of the project.

The PM might create a Responsibility Assignment Matrix (or RACI chart) that details who is responsible, accountable, consulted and informed about key project deliverables. This should be reviewed by the team to gain their buy-in and allow them to discuss any issues. The PM may also create job-descriptions for each project role. The job description might define:

- Title of the role
- Department Reports to (to whom the person directly reports)
- Overall project responsibility
- Key areas of responsibility
- Consults with (those who the person works with on a regular basis)
- Necessary skills and experience required
- The job description should be discussed with the team member to ensure that each member understands and agrees what their role shall entail.

2. Communication is very important in all teams and this is a specific challenge in virtual teams where team members might be physically separated, for example a national or global project where team members may be sited in the UK, Far East, America, Europe etc. In this situation the project manager would need to consider the challenges faced by lack of face-to-face contact, time differences etc.

Communication can be formal, informal, written and verbal with the message being augmented by the use of tone (e.g. aggressive, passive etc.) and body language. There are also a number of barriers to communication such as indirect communication, the use of slang or technical jargon, cultural issues etc. The project manager should consider these barriers and think about how they can be overcome.

3. Objectives should be SMART:

- Specific: clearly defined and documented
- Measureable: define how performance will be tracked and measured
- Agreed: objectives should be agreed with the relevant stakeholders
- Realistic: the objectives can be achieved with the resources available
- Time-bound: the date when the objectives will be measured.

4. The PM must understand models such as:

- McGregor - theory X and theory Y
- Maslow - motivators and hygiene factors
- Herzberg – hierarchy of needs
- Vroom – expectancy theory
- These are important to make sure that team members are motivated and that the project is delivered on time, within budget and to the specified quality.

5. The PM might analyse stakeholders to make sure project communications are valid:
This includes:

- Identifying stakeholders
- Finding out what their needs and expectations are (plot on a stakeholder map)
- Managing their needs and expectations
- He might also lead the team by being autocratic or democratic.

Commentary

The first point to note that is that there is no clearly defined list or sub-headings in the answer. This is likely to mean that the delegate has already lost 15 marks and is now working to a maximum of 35 marks.

Much of part 1 is relevant to the question but the delegate has gone into too much detail in certain areas and has undoubtedly spent too long on this section. This will have a significant detrimental impact on other parts of this answer and / or later questions in the examination.

In part 2 the delegate has discussed the topic of communication at length but failed to describe any specific actions the project manager may take to ensure effective communication is in place.

Part 3 does not have the necessary depth of description. Other than an explanation of the SMART mnemonic, no other actions are described. The answer also lacks any explanation of why this action is relevant to ensure the associated feature is in place.

Part 4 is little more than a dump of some theoretical models (and some are incorrectly referenced!). Although relevant to the point being made, the delegate has failed to link the theory to practical actions that might be undertaken by the project manager to ensure team members are appropriately motivated.

It appears the delegate may have gone off at a tangent in part 5, a common result of not clearly listing the feature to be discussed and fitting your answer to the question you think you are being asked!