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Introduction

Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international and European standards, comments will be reviewed by the relevant UK national committee before submitting the consensus UK vote and comments. If the draft standard is approved, it is usual for the resulting published standard to be adopted as a British Standard.

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UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

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Project management – Principles and guidance for the management of projects

DRAFT

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Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on XX Month 201X. It was prepared by Technical Committee MS/2, *Project management*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This British Standard supersedes BS 6079-1:2010, BS 6079-2:2000 and BS 6079-3:2000, which are withdrawn.

Relationship with other publications

The principles and guidance in BS 6079-1 can be embodied in structured methods such as PRINCE2 [1], [2], other standards such as ANSI/PMI 99/001 and in standard bodies of knowledge such as the *APM body of knowledge* [3].

Information about this document

This is a full revision of the standard, and introduces the following principal changes:

- formally recognizing the organizational context of projects through the introduction of the "higher level management" role and its associated activities; and
- the addition of activities relating to the requirements definition, design, development, verification and validation of a project's primary outputs.

This revision focuses on the importance of projects being driven by organizational needs, drawing on cross-functional teams of specialists in pursuit of the stated business objectives. To this effect, the current text includes a fully revised set of accountabilities and process models which explicitly differentiate the directing of a project, with a view to achieving the benefits, from managing a project, with a view to delivering the outputs.

Use of this document

As a guide, this British Standard takes the form of guidance and recommendations. It should not be quoted as if it were a specification or a code of practice and claims of compliance cannot be made to it.

Presentational conventions

The guidance in this standard is presented in roman (i.e. upright) type. Any recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. "organization" rather than "organisation").

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

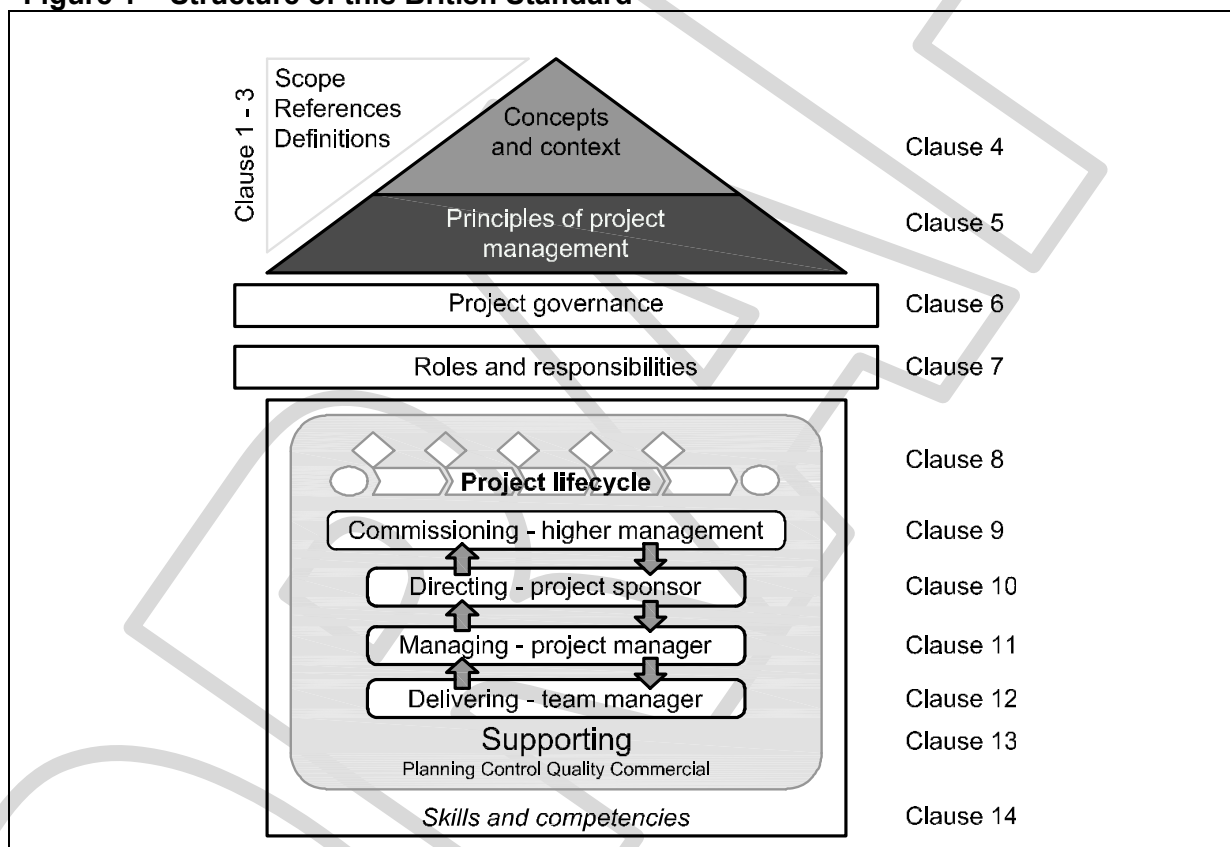
Introduction

This British Standard aims to help people achieve a desired outcome of a project efficiently and effectively and to support the improvement of organizational project management capability. The principles provided in this standard are relevant to projects of all sizes, complexity and duration, and their application is proportional to the circumstances and needs of the organization delivering them.

This British Standard draws attention to the management challenges and opportunities encountered in different project environments and presents possible approaches to these. The approaches presented are intended to be treated as guidance only; they might need to be tailored to suit the particular circumstances in which they are being used.

Without a focus on the required objectives, the full support of senior management for the project manager and team, and the appropriate choice and use of planning and control techniques, a project would usually fail to achieve the desired outcomes. Figure 1 illustrates the structure of this British Standard, showing how each clause contributes to a full understanding and application of project management as a whole.

Figure 1 – Structure of this British Standard



1 Scope

This British Standard sets out principles and guidance for the sponsoring, directing and managing of projects. It is relevant to all industry sectors as well as the public, private and voluntary sectors, regardless of the size or type of the organization or project. It is intended that the application of this standard is proportional to the circumstances and needs of the particular organization.

This British Standard provides guidance to senior managers, project practitioners and those who interact with project teams, regardless of project management experience. This includes:

- a) managers in organizations that undertake projects;
- b) project sponsors;
- c) project managers;
- d) team managers and members;
- e) project support staff, including members of project management offices;
- f) business and technical specialists; and
- g) educators and trainers.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this British Standard, the following terms and definitions apply.

3.1 acceptance criteria

performance requirements and essential conditions that are to be achieved before project deliverables are accepted

3.2 bar chart

chart on which activities and their durations are represented by lines drawn to a common time scale

NOTE A Gantt chart is a specific type of bar chart and should not be used as a synonym for bar chart.

3.3 baseline

reference levels against which the project plan or outputs are monitored and controlled

3.4 business case

documented justification to support decision making about the commitment to a project, programme or portfolio

[SOURCE: ISO/TR 21506:2018, 3.2.4]

3.5 change control

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

3.6 configuration

functional and physical characteristics of a product as defined in technical documents and achieved in the product

NOTE In a project this would contain all items that can be identified as being relevant to the project and that are only to be modified after authorization by the relevant manager.

3.7 contingency plan

alternative course(s) of action devised to cope with project risks

3.8 critical path

sequence of activities that determine the earliest possible completion date for the project or phase

[SOURCE: ISO/TR 21506:2018, **3.4.10**]

3.9 earned value

value of completed work expressed in terms of the budget assigned to that work

NOTE Earned value is also known as budgeted cost of work performed.

[SOURCE: BS ISO 21508:2018, **3.1.5**]

3.10 earned value management

method that integrates project or programme scope, actual cost, budget and schedule for assessment of progress and performance

[SOURCE: BS ISO 21508:2018, **3.1.6**]

3.11 governance

principles, policies and framework by which an organization is directed and controlled

[SOURCE: ISO/TR 21506:2018, **3.8.1**]

3.12 management plan

documented description of the approach, methods and processes required to manage a specific activity

NOTE Examples include risk management plan, configuration management plan, project's management plan.

3.13 milestone

significant planned or to be planned point in a project, programme or portfolio

[SOURCE: ISO/TR 21506:2018, **3.11.4**]

3.14 outcome

result of change, normally affecting real-world behaviour and/or circumstances

NOTE Outcomes are desired when a change is conceived. They are achieved as a result of the activities undertaken to effect the change.

3.15 output

specialist product (the tangible or intangible artefact) that is produced, constructed or created as a result of a planned activity

3.16 phase

division of the project life cycle into manageable sets of activities, such as conception, development, realization and termination

3.17 process

set of interrelated resources and activities which transform inputs into outputs

3.18 product breakdown structure

decomposition of the product into its components

[SOURCE: ISO/TR 21506:2018, **3.14.12**]

3.19 programme

group of programme components managed in a co-ordinated way to realize benefits

[SOURCE: ISO/TR 21506:2018, **3.14.13**]

3.20 project

temporary management environment, usually undertaken in phases, created for the purpose of delivering one or more business outputs or outcomes

NOTE A project might be standalone within a portfolio or part of a programme.

3.21 project complexity

measure of how difficult it is for an organization to undertake a specific project

NOTE This can be absolute or relative. Absolute complexity relates to the inherent difficulty of a project, regardless of organizational capability. Relative complexity relates to a specific organization's capabilities.

3.22 project management

planning, monitoring and controlling all aspects of a project and the motivation of those involved in it to achieve the project's objectives

3.23 project's management plan

documented description of the approach, methods and processes required to manage the project, including project organization

3.24 project plan

documented description of the activities, schedule, costs and resources through which the project's objectives are to be achieved

3.25 resource

any variable capable of definition (including people, finance and materials) that is required for the completion of an activity and might constrain the project

NOTE A resource could be non-storable, so that its availability has to be renewed for each time period (even if it was not used in previous time periods). A resource could also be storable so that it remains available unless depleted by usage. Such a resource might also be replenished by activities producing credited and storable resource.

3.26 risk

uncertain event or set of events with a potential positive or negative impact

[SOURCE: BS ISO 21505:2017, **3.3**]

3.27 sponsor

person responsible for obtaining the resources and executive decisions to enable success

[SOURCE: ISO/TR 21506:2018, **3.17.2**]

3.28 stakeholder

person, group or organization that has interests in, or can affect, be affected by, or perceive itself to be affected by, any aspect of the project

[SOURCE: BS ISO 21500:2012, **2.14**]

3.29 work breakdown structure

decomposition of the defined scope of the project or programme into progressively lower levels consisting of elements of work

[SOURCE: ISO/TR 21506:2018, **3.21.1**]

4 Concepts and context

4.1 Projects

4.1.1 What is a project?

Projects are the mechanism used by organizations to change their day-to-day operational ("business as usual") activities. They are the engines of change in an organization and all organizations undertake projects.

Projects are temporary management environments, usually undertaken in phases, created for the purpose of delivering one or more business outputs or outcomes. They:

- a) create or enable specific benefits, outcomes and/or outputs;
- b) have a finite duration with planned start and end dates;
- c) invariably have effects both inside and outside of the organization;
- d) are supported by an organization that is temporary and can sometimes change through the project life cycle;
- e) are undertaken in manageable steps, called "phases", to take account of risk and uncertainty; and
- f) are seldom carried out in isolation, and can often interact with other projects and organizational entities.

4.1.2 Why organizations undertake projects

The motives for changing an organization's operational activities are as varied as the range of organizations that exist and might include:

- a) strategic long-term business transformation;
- b) research and development (R&D);
- c) to develop or update products or services;
- d) to improve administrative or operational efficiency; and
- e) to respond to changing patterns of demand.

An organization might undertake a project for itself or might undertake the project for another organization as a supplier.

4.2 Project management

4.2.1 What is project management?

Project management comprises planning, monitoring and controlling all aspects of a project and the motivation of all those involved in it, to achieve the project's objectives.

4.2.2 The benefits of project management

Having a formalized approach for managing projects has been shown to increase the chances of project success by enabling organizations to:

- a) increase the likelihood of delivering the project's outputs and achieving the project's outcomes and, hence, organizational objectives;
- b) improve the predictability and consistency of project delivery;
- c) improve the certainty of delivering the project within the predicted budget;
- d) achieve value for money;
- e) use scarce resources more efficiently; and
- f) develop competence and capability to deliver change.

4.2.3 Key components of project management

Project management comprises four key components:

- a) project governance – the principles, policies and framework by which a project is directed and managed (see Clause 6);
- b) project life cycle – the high-level set of steps for undertaking the project (see Clause 8);
- c) project delivery approach – the way in which the project's outputs and outcomes are undertaken and delivered (see 4.5); and
- d) project management activities – the day-to-day activities used to manage the project (see 4.6);

Whilst the components of project management can be used on any type of project, if they are to be used efficiently and effectively they should be tailored and adapted to suit the particular circumstances of each organization and project being undertaken. This tailoring is influenced by the project context.

Smaller organizations characteristically undertake projects without recognizing them or having any formal way of managing projects. As organizations grow they typically start to recognize projects as different to other work and increasingly formalize project management (see 4.3.6 for information on project complexity, organizational capability and maturity).

4.3 Project context

4.3.1 Key aspects of the project context

The project context is the environment and circumstances in which a project is undertaken. It influences the choice of the most appropriate project governance, life cycle, management and delivery approaches to be used.

Project context is a combination of:

- a) the importance of the project to the organization;
- b) the role of the organization in the project;
- c) the operating model of the organization
- d) the relationship of the project to programmes and portfolios; and
- e) project complexity and organizational capability and maturity.

NOTE Project importance and project complexity are both significant factors in determining how to manage a project, but they are not the same. An important project which has far reaching significance for an organization might actually be very simple to undertake.

4.3.2 The importance of the project to the organization

The importance of the project to the organization typically drives decisions related to project governance, such as:

- a) the level of governance and scrutiny the project should be subjected to, especially in relation to decision making and assurance;
- b) the most appropriate people to be involved in the project in terms of direction, assurance, management and the delivery of the outputs and outcomes; and
- c) the degree to which the organization is willing to accept the risk of the project failing or not delivering its outcomes.

4.3.3 The role of the organization in the project

There are primarily two roles that an organization can take in a project. These roles are as:

- a) the customer (or promoter) organization, to contribute to the achievement of its own objectives. The customer organization owns the need for change and can either deliver all of the change themselves, or contract some or all of the change to a supplier organization; or
- b) a supplier (or contracting) organization, to make money by providing a service to another organization in achieving its objectives through the delivery of a project.

The distinction between customer and supplier organizations is not always obvious, especially where a supplier organization both delivers and operates the outputs from the project, such as in an outsource arrangement.

The role of the organization on the project typically determines:

- 1) how project governance operates on both sides of, and across, a contractual boundary; the structure of the promoting organization's project management team; and the most appropriate people to be involved in the project; and
- 2) the working practices to be adopted in relation to the project life cycle, project management activities and project delivery approach. These might be adopted and tailored from either party's approaches or developed specifically for the project.

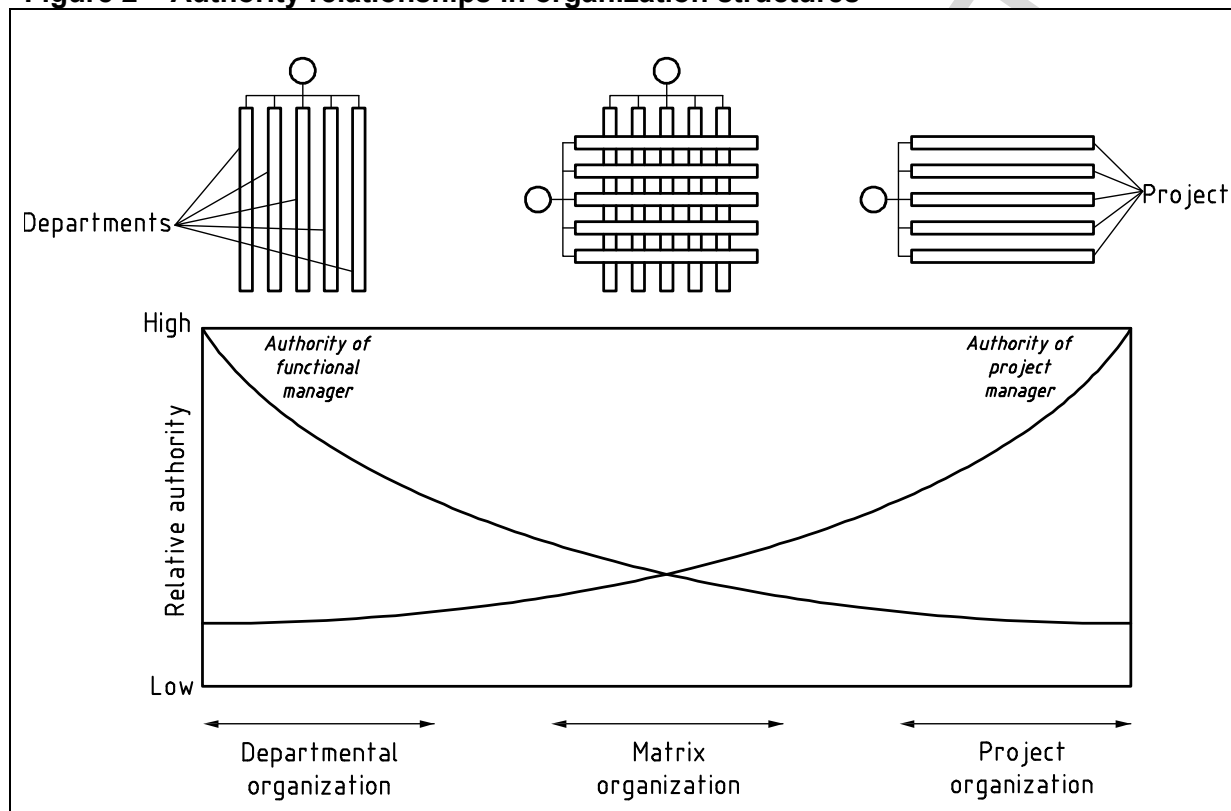
4.3.4 The operating model of the organization

Projects can be undertaken within organizations that already have the structures necessary to support project work. Such organizations might be oriented exclusively towards projects or, more commonly, might adopt a matrix structure, with accountability being assigned between the project team and the functional departments. Organizations which are set up solely on functional lines generally find the undertaking of project management ineffective and inefficient.

Departments are usually responsible for the quality of the deliverables and require clear scopes of work from the project manager (work packages). A commitment from the functional areas is usually needed concerning task duration, costs and quality. Subcontractors can be treated in the same way as an in-house function, except that relationships between the subcontractor and the project manager are defined in a formal contract.

Project management structures can be integrated with organization structure. In such cases, because of the unique nature of projects, project management needs a higher degree of flexibility than a more stable functional organization. Figure 2 illustrates the primary forms of operating model and how the authority relationships change between them.

Figure 2 – Authority relationships in organization structures



4.3.5 The relationship of the project to programmes and portfolios

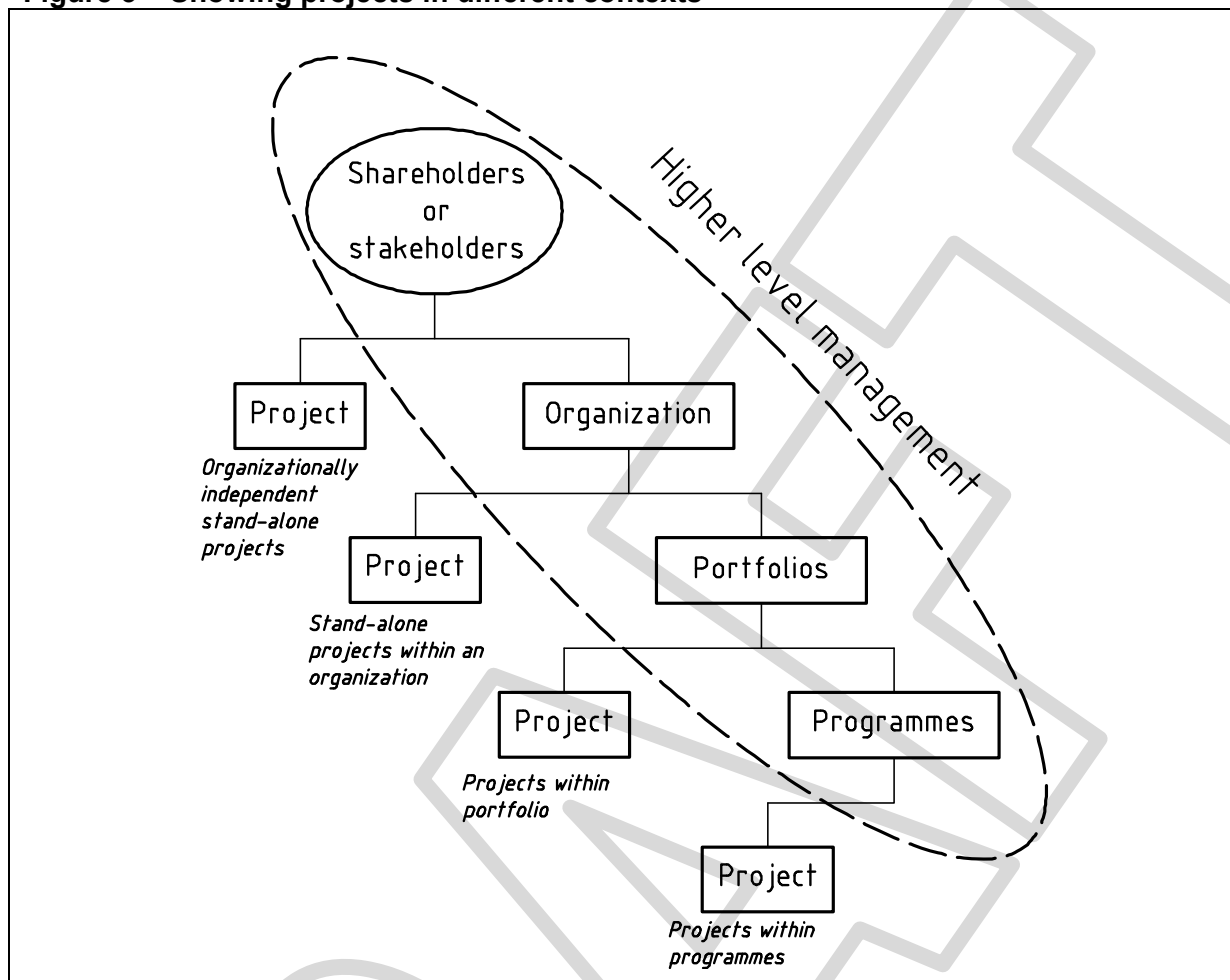
As an organization undertakes more projects, those projects tend to become progressively more complex and interdependent. As a result, the organization might structure and co-ordinate its projects and other related work as programmes and portfolios.

A project might be standalone within the organization or in a separate legal entity, or part of a programme or portfolio as shown in Figure 3.

The fundamentals of project management are the same in all situations, but what typically changes is:

- a) how project governance operates and, in particular, the level of reporting and level for decision-making; and
- b) who defines the key components of project management.

Figure 3 – Showing projects in different contexts



4.3.6 Project complexity, organizational capability and maturity

Project complexity is a measure of how difficult it is for an organization to undertake a specific project. The more complex a project is for an organization, the less likely it is to deliver the intended outcomes and outputs.

Project complexity can be measured in relative terms or absolute terms. This British Standard uses the term “complex” for relative difficulty. For example, building a new airport terminal would be more complex for an organization with little relevant experience than for an organization that specializes in airport development.

The relative complexity of a project for a specific organization is driven by:

- a) experience: whether the organization has experience of similar projects and, if not, what aspects of the project make it new or innovative. For example, the project might involve new processes or technologies that the organization has little or no experience of; or the project might have experience of similar projects, but at a much smaller scale;
- b) capability and maturity: whether the skills, knowledge and tools needed to deliver the project are available to the organization; and
- c) uncertainty: whether there are actions that can be taken to reduce uncertainty, such as research and experimentation.

Project complexity primarily drives the degree and rigour of project governance. It also drives the degree to which the organization might need to depend on external suppliers to fill shortfalls in the skills, knowledge and experience needed for the project.

The more complex a project, the greater the inherent risk of not delivering the intended outcomes. The complexity of the project should be regularly assessed by the sponsor and project manager in order to ensure that action is taken to reduce project complexity when and where possible. Furthermore, by assessing a portfolio of projects in terms of their complexity and significance, it enables the programme board, or higher authority, to critically examine projects in terms of their risk; enable them to be managed according to the organization's appetite for risk; and apply available resources and skills in the best way to deliver the most desirable outcomes. It also ensures that the organization's managers are aware of the most complex, and therefore risky, projects in their portfolio and ensures that appropriate assurance and management attention is applied. If applied consistently within an organization, it might also form part of the assessment prior to a "go/no go" or deferral decision at a project gate.

4.4 Project organization

Senior leaders should ensure that an appropriate project organization is in place to undertake the project. This project organization is temporary and depends on the size, scale, complexity and nature of the project. Projects, typically, cut across departmental and organizational boundaries.

The design and implementation of project organizations should take into account the informal aspects of project management, such as motivation and co-ordination of project staff as well as levels of interpersonal skills and behaviours.

Typical roles in a project organization and their roles are set out in Clause 7.

4.5 Project delivery approaches

Whilst project management practices can be applied to any type of project, the type of project output and outcomes to be delivered influence the strategy and approach to undertaking work on specialist deliverables. Different types of output or outcome require different delivery approaches, which in turn might determine the most appropriate project life cycle to be used (see Clause 8) and approach to operating project governance and project management activities.

The delivery approaches used for a project's outputs and outcomes should be defined in, or referenced from, the project's management plan. This reflects how requirements are determined, the solution defined, built and integrated into any existing environment, and how the solution and its requirements are verified and validated (see Clause 12 and 13.3.4).

For simple, single output projects, the delivery approach and project life cycle might be explicitly linked at a project level.

For projects with multiple outputs, the delivery approach would be applied for each work package, as different work packages might be using different delivery approaches.

NOTE 1 Delivery approaches are commonly called methodologies or development methods.

NOTE 2 An example of how delivery approach can influence the project life cycle is that the design and construction of a building would entail a different approach to the development of software. A building would require using construction codes and practices and standards which for software, software engineering methods and standard would be applicable. The development of software could include an agile approach (see Annex A).

4.6 Project management activities

4.6.1 General

The management of a project comprises activities to:

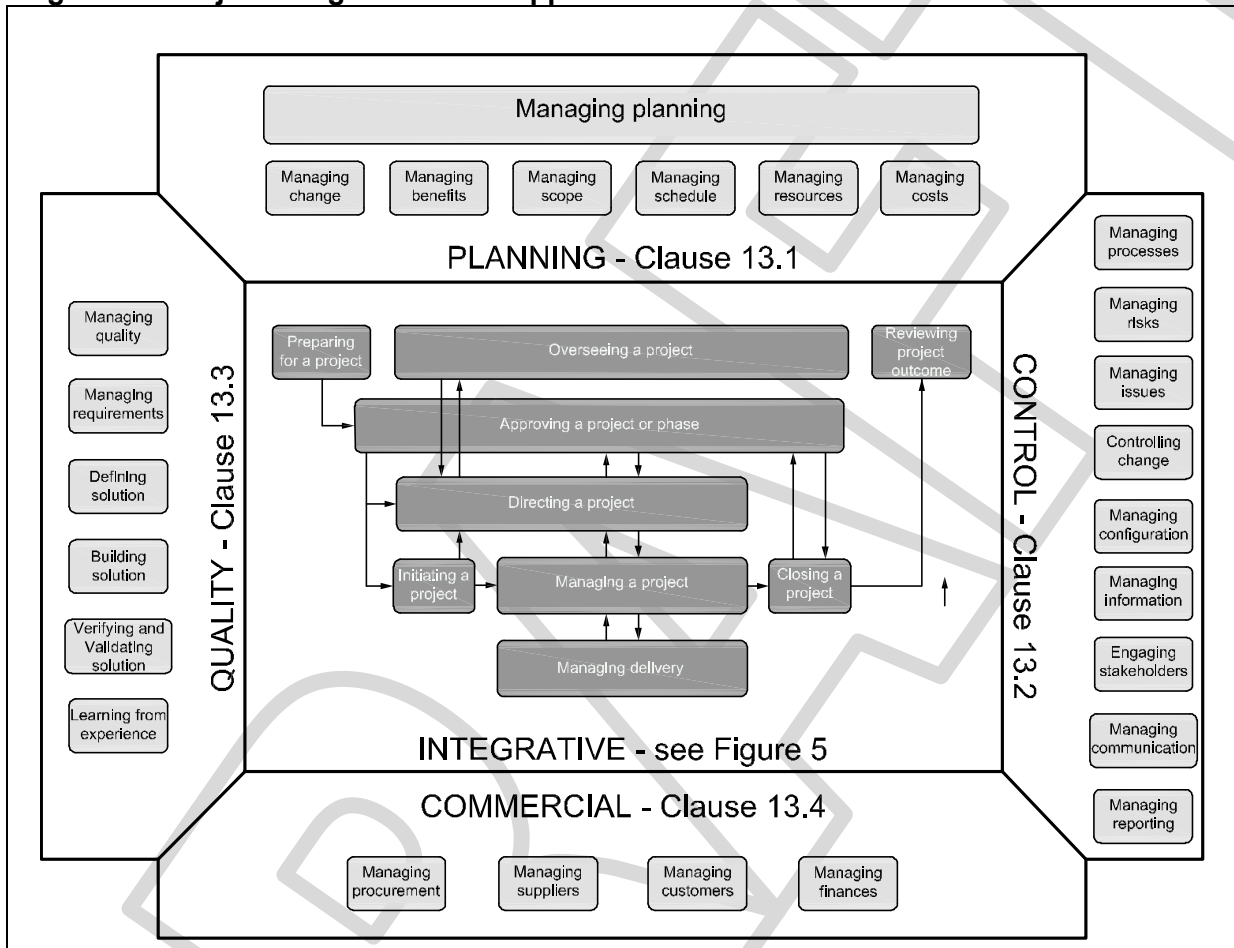
- a) manage the project through the project life cycle in a controlled manner, ensuring all aspects of the project are co-ordinated. These are referred to in this British Standard as project integration activities (see 4.6.2); and

- b) ensure the consistent and predictable application of project management techniques, required as part of undertaking the integration activities, by the project team. These are referred to in this British Standard as project support activities (see **4.6.3**).

Such activities are often defined in an organization as a set of processes, procedures or methods, which prescribe what needs to be done, by whom and how.

Figure 4 shows the project support activities (around the edge of the figure) which can be drawn on when undertaking any of the integration activities (in the centre of the figure).

Figure 4 – Project integration and support activities



4.6.2 Project integration activities

Integration activities provide co-ordination and control of the project's progress through the project life cycle and ensure the integration of the project's constituent parts.

The integration activities are described in detail in Clause **9** to Clause **12** and comprise:

- commissioning a project, comprising preparing for a project; overseeing a project; approving a project or phase within a project; and reviewing project outcome (see Clause **9**);
- directing a project (see Clause **10**);
- managing a project, comprising initiating a project; managing a project; and closing a project (see Clause **11**); and
- managing delivery (see Clause **12**).

Figure 5 shows each of the project integration activities together with:

- 1) the roles accountable for each activity;
- 2) the interfaces and information flow between each activity.

Figure 5 – The principle information flows between the project integration activities

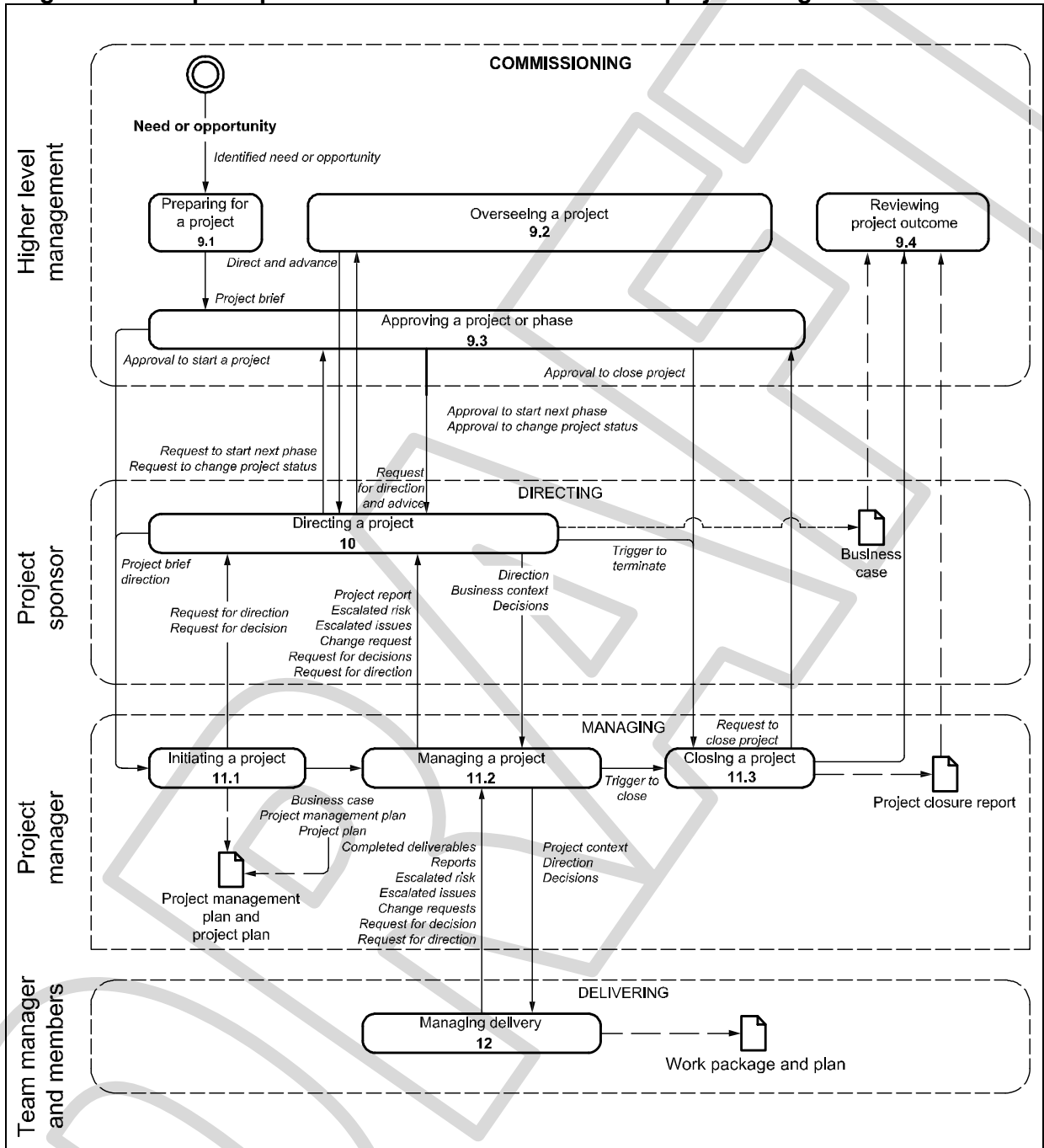
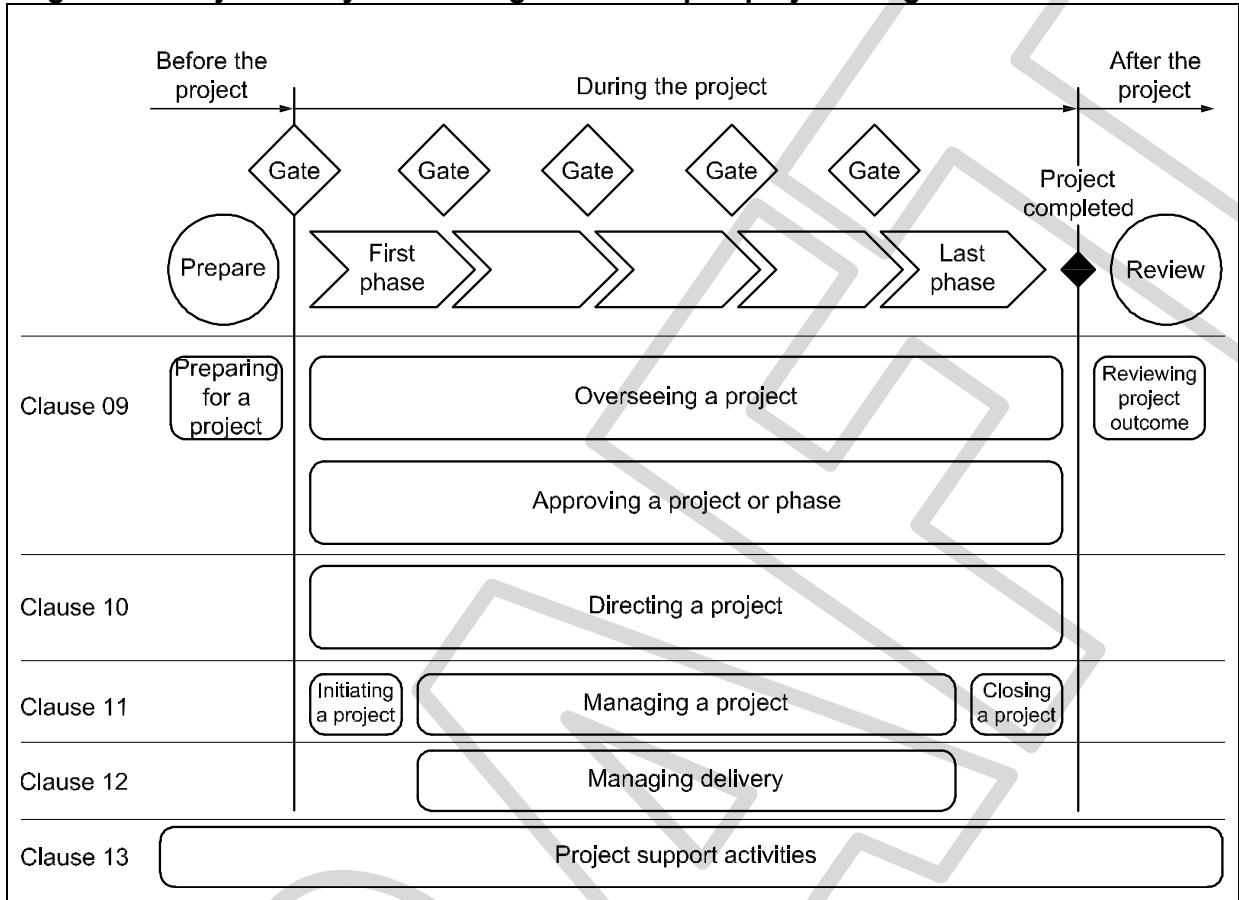


Figure 6 shows the timing of the project integration and support activities in relation to the project life cycle.

Figure 6 – Project life cycle showing relationship to project integration activities



4.6.3 Project support activities

Support activities provide techniques and controls which have been shown to be effective in managing projects. In particular, they are employed as part of the control cycles used to manage the project on a day to day basis throughout the project life cycle.

Support activities are described in detail in Clause 13 and can be summarized as relating to:

- planning;
- control;
- quality; and
- commercial.

5 Principles of project management

5.1 Be driven by needs and benefits

Senior leaders in an organization should be able to demonstrate explicitly how each project they undertake contributes to their strategy. Those projects which do not align with or contribute to organizational strategy should be screened out as soon as possible.

Strategic fit ought to be assessable from the beginning when a project is proposed; organizations which have clearly communicated strategies are able to screen more effectively than those which don't. Without a clear strategy and effective screening of proposed projects, there is likely to be more projects competing for scarce resources, resulting in the organization losing focus and jeopardizing its overall performance.

The validity and viability of the project should be monitored, in terms of both progress to date and predictions of project outcome. The organization should be prepared to redirect or terminate a project if the project's objectives are not likely to be met.

5.2 Engage stakeholders throughout the project

There should be appropriate communication and involvement with internal and external stakeholders throughout a project. The involvement of stakeholders, such as suppliers, users and customers, adds value in all phases of a project. Usually, the earlier stakeholders are involved, the better the project's result. If a project is to be successful in terms of outcomes achieved and benefits realized, its outputs need to be acceptable to the stakeholders. Stakeholders might be those developing aspects of the project's outputs, future users of the outputs or those impacted by them, either during development or in operation or disposal. A solution is more likely to be acceptable if the project team understands the stakeholders' needs and viewpoints and takes them into account in the project plan and choice of solution. Involving the stakeholders is a powerful mover for change, while ignoring them can lead to failure.

5.3 Having a single point of accountability is critical throughout the project

Single point accountability for a project is critical to its successful delivery. Projects are often too large and complex for a single individual to manage every aspect personally. For this reason, projects are broken into life cycle phases and work packages, which are the accountability of a named individual. Work packages can be further divided into smaller work packages and ultimately into individual activities and tasks. In practice, single point accountability means that every task, activity and work package at any level in the work breakdown structure should have a single person accountable for its delivery in order to ensure that:

- a) it is clear what is expected of each person;
- b) accountability is traceable throughout the project organization;
- c) overlaps are eliminated, as no deliverable can be delivered within two different work packages;
- d) that where any gaps in accountability appear (e.g. due to loss of a team member), the next person up the breakdown structure is accountable to fix it; and
- e) that if scope, cost or time prove to be inadequate to create the deliverables, it is clear who is accountable for raising these issues and who to escalate the issue to.

5.4 Promote collaborative working

Collaborative working should be promoted to ensure that all necessary work is co-ordinated and controlled. The need for many projects to draw on people from a range of departments means that a collaborative team approach is essential. Running projects in functional or departmental units with co-ordination between them usually slows down progress, produces less satisfactory results, and increases the likelihood of errors. Organizations which use

projects as a management approach should have working practices which ensure lateral co-operation and communication across all functions involved. Governance and decision making should also be on a collaborative and cross-functional basis.

5.5 Use a common management framework with tailored processes and methods

Project delivery organizations should have a common approach to directing and managing projects. This enables all members of the organization and their stakeholders to have a shared understanding of the overall approach and what is expected of them. If an organization has a standard project management approach, this should be tailored by the project manager, to suit the particular project and its context. Tailoring is not, however, a licence for ignoring standard methods. Tailoring should be undertaken within permitted limits or, if outside those limits, approved by an appropriate manager, in a controlled way.

5.6 Governance and management should be appropriate and proportionate

In order for a project to remain viable, the effort and costs of undertaking governance and management should be appropriate and proportionate to the work being undertaken, risks involved and benefits likely to be realized. Organizational approaches should be tailored in order to reduce the management effort, whilst maintaining rigorous control.

5.7 Experience and lessons should be captured, shared and applied

At the start of any project, those involved and key stakeholders should identify and apply relevant lessons from previous experience when planning the project. Throughout the project life cycle, lessons should be continually captured, evaluated and action should be taken to mitigate delivery risk and facilitate continual improvement of the final project deliverable. Where relevant, organizational project management approaches should be updated and these changes communicated to the wider organization to benefit other project teams.

5.8 Define working methods for specialist deliverables and outputs

In order to ensure the quality of the project's outputs, the methods through which a project's specialist outputs and outcomes are developed or achieved should be defined.

Due the unique nature of projects there might be working methods and process that need to be developed or defined to manage specialist deliverables such as special environments or facilities required. These working methods should be developed early in the project life cycle and improved as the project progresses.

5.9 Take a phased approach to projects

The outcome of a project is always uncertain and often requires investigative work to determine what outputs are required and whether different options for a solution are viable in business and technical terms. A phased approach should be taken by breaking the project into life cycle phases, each of which progressively adds to knowledge regarding the project and reduces risk. In this way, the amount of funding committed to the projects is limited and only extended, once continuation of the project into the next phase has been justified.

6 Project governance

6.1 What is project governance?

Project governance comprises the principles, policies and framework by which a project is directed and managed. It sets out the constraints within which those involved in the direction, management and implementation of projects should act and, as such, provides the empowerment, authority and oversight which is necessary for effective project management.

A governance framework should include the authority limits, decision making roles and rules, degree of autonomy, assurance needs, reporting structure, accountabilities and responsibilities together with the appropriate management frameworks.

Project governance should be an integral part of, and align with, the governance of the organization within which the project is being undertaken.

6.2 Aspects of project governance

6.2.1 General

Project governance influences the working methods and process, roles and responsibilities, reporting and contractual aspects of a project's management framework for those management activities covered in Clause 9 to Clause 13 covering the integrative and support activities.

6.2.2 Decision-making

Decision-making is critical to the success of projects. Ineffectual decision-making has been shown to be a major factor in project failure. Authoritative decisions are needed for:

- a) indicating the sponsor's continued commitment – or otherwise – to the business objectives and the means by which they are to be achieved;
- b) approval of the allocation of resources, particularly finance;
- c) timing of key project events;
- d) relationships with external organizations, including suppliers;
- e) changes to the project's organization structure; and
- f) acceptance or otherwise of changes to the project.

When making decisions, it should be clear:

- 1) who has the authority to make decisions and on which aspect of the project;
- 2) by when the decision needs to be made;
- 3) the organizational policies and other criteria against which the decision should be made;
- 4) who (which role, person or group) is accountable for the decision; and
- 5) which stakeholders and subject matter experts should be consulted to ensure that decision makers have reliable advice upon which to base their decisions.

Decisions should be:

- holistic, taking account of the external context, whole life of outputs (such as in life service, disposal) and negative impacts;
- phased, where possible, to take into account risk;
- communicated to the relevant stakeholders;
- appropriate to the level of authority of the decision-maker; and
- traceable through the project organization.

Decisions should be traceable throughout the project so that it is clear what primary decision any lower level decisions depend on and vice versa. For example, as when a project manager on receiving direction to start a phase from the project sponsor, authorizes a team manager to start the delivery of a work package.

Decisions can be conditional, in which case actions should be agreed on what is required to fulfil such conditions, including who is accountable and the timescale within which any conditions should be met.

6.2.3 Project assurance

Assurance is the systematic set of actions necessary to provide confidence to senior leaders and stakeholders that the project is:

- a) aligned with the organization's strategy;
- b) under control;
- c) likely to realize the required benefits;
- d) likely to deliver the desired outcomes; and
- e) operating at an acceptable level of risk.

Project assurance is the responsibility of the project sponsor (see **7.3**) and should be:

- 1) proportionate to the overall risk the project represents to the organization;
- 2) planned, such that the project timescale, funds and resources are adequate to carry out the associated activities; and
- 3) timely, such that project assurance activities are undertaken at a time when they can influence the outcome of the project, such as prior to significant decisions or commitments.

Assurance activities might include:

- the use of a management system and framework, as defined in an organization's policies and operating procedures and within the project's management plan;
- coaching and mentoring those undertaking key project roles;
- review and approval of key documentation;
- gating decisions; and
- audits or reviews of part or all of the project.

Project assurance reviews should be carried out by people who are independent from those people who are directly involved undertaking the project. Assurance reviews might be used at progressive levels of independence, such as:

- reviews conducted by people who are not directly engaged in the work;
- reviews carried out by a specialist and experienced assurance or quality function
- internal audit function; and
- external audit.

6.2.4 Policies, processes and methods

Governance is usually documented as part of a project's management plan and can be determined or constrained by:

- a) the organization's overall policies, methods and procedures. These include not only those for project management, but also those such as ethics, sustainability, finance, procurement and human resource management; and

- b) a programme or portfolio's management plan – if the project is part of programme or portfolio.

NOTE See Clause 9 to Clause 13 for integrative and support activities which might be covered by policies, processes and methods.

6.2.5 Roles and responsibilities

The roles and responsibilities for those working on a project should be defined. This includes, but is not limited to, who each is responsible to and what activities, outputs or outcomes they are responsible for.

NOTE Guidance on roles and responsibilities is provided in Clause 7. Skills and competencies of those working on projects are included in Clause 14.

6.2.6 Reporting

Reporting ensures the project sponsor, project board, project manager, team managers and other stakeholders are aware of the current status and outlook for the project, particularly with respect to the likelihood of achieving its objectives.

A reporting framework should be designed to meet the needs of the identified report recipients in a timely manner.

NOTE See 13.2 for further information on control activities.

6.2.7 Contracts with suppliers or customers

Many projects require the involvement of a number of parties from different organizations. The relationships between the parties are defined in contracts and form part of, and constrain, the governance of a project to which such contracts relate.

NOTE See 13.4 for further information on commercial activities.

6.3 Factors influencing governance arrangements

6.3.1 General

In addition to the project context (see 4.3), the governance of a project can be influenced by factors including:

- a) the nature of the outcome or output;
- b) legal and regulatory aspects;
- c) ethics;
- d) health and safety;
- e) environment and sustainability;
- f) security;
- g) power of stakeholders; and
- h) project owned by multiple parties.

These factors, and the project context, are seldom static and should be kept under regular review to ensure that the governance arrangements for a project are appropriate and proportionate.

6.3.2 The outcome or output

The governance and management of specialist work within a project should reflect the types of output and degree of change expected, and influences the design of the project life cycle and delivery approaches to be used.

The solution and outcomes which result from a project can also influence project complexity (see 4.3.5). The more complex a project's solution and the more extensive the changes that result from developing and implementing a solution, the more likely there are to be unforeseen side effects which might threaten the success of the project. It should be clear:

- a) who is accountable for the integrity and appropriateness of a solution (solution owner);
- b) the decision-making considerations and relative authorities of the project sponsor and owners of solutions, especially when they come into contention;
- c) who can make decisions relating to a solution or output and who should advise them;
- d) how different teams should work together on interfaces between different parts of a solution or output; and
- e) the responsibilities for identification and rectification of any faults found in testing or trials.

NOTE See 13.1.1 for information on management of change and 13.3.4 for solution development.

6.3.3 Legal and regulatory aspects

All organizations are subject to external constraints, dictated by regulation, legislation, common law and contracts. Some of these might be sector-specific and/or span more than one country. These can:

- a) constrain the degree of freedom an organization has to act; and
- b) require specific approvals for certain types of activity and outputs.

NOTE Particular attention is drawn to legal and regulatory constraints such as:

- financial and taxation matters, which can significantly affect the costs and benefits for a project and the movement of goods across state boundaries;
- employment legislation, which can dictate working hours and the ability to hire and redeploy staff;
- contract law, which can constrain the form, terms and content of contracts which might be used for the supply of goods and services; and
- security and data protection.

6.3.4 Ethics

The project sponsor should ensure that the project manager and team are aware of, understand and comply with any ethical constraints. In particular, steps should be made to ensure the project complies with the norms of ethical behaviour and public interest such that it could, if necessary, withstand intense public scrutiny.

NOTE An example of a published code of ethical constraints is the APM code of professional conduct [4].

Ethics comprises the moral principles that govern a person's behaviour or the conduct of an activity. In addition to legal and regulatory requirements, an organization can also impose ethically-based constraints on itself and its suppliers, by limiting the working practices and the behaviours of those involved. Such restrictions might be set at an organizational level in which case, the project sponsor and team should comply with them. In other cases, the project sponsor can set ethical boundaries for the project team, taking into account, or in the absence of, an organizational ethics framework. Where several organizations are involved contractually in a project, supplier organizations need to be aware of ethical requirements at the time that contractual relations are established.

Whatever the case, the sponsor should ensure that ethical considerations are identified and documented, for example in a code of conduct. Steps should be taken to ensure that staff in both the sponsoring and any supplier organizations are familiar with them. There should also be procedures in place for breaches of ethical standards to be identified and appropriate remedial action to be taken. Processes should also be in place to deal with the allegations of any breaches of those standards. Such allegations should be based on evidence, and those

obstructing the reporting of any breaches should be subject to possible disciplinary action. All these procedures would be part of project governance.

The underlying values should wherever possible be supported and embedded in project management procedures, so that, for example, progress reporting is transparent and evidence-based to ensure progress reports can be trusted as fair and accurate.

Ethical obligations stretch beyond those owed to people having organizational or contractual relationships within the project to external parties, who might not even be aware they could be affected by the outcomes of a project. Part of project risk management (see **13.2.2**) should explicitly address risks to third parties.

6.3.5 Health and safety

Risks to health and safety should be evaluated in order to ensure such risks are understood and any threats reduced to an acceptable level.

In particular, managers should ensure:

- a) safety management information is provided;
- b) staff are aware of and trained to use safety related equipment;
- c) hazards are identified and preventative actions taken;
- d) risk assessments are conducted; and
- e) accidents are reported and recorded, and actions taken to reduce the risk of recurrence.

6.3.6 Environment and sustainability

Sustainability describes an environmental, social and economically-integrated approach to development which meets the present needs without compromising the environment for future generations.

The management of environment and sustainability should be covered in the project's management plan, if they are not already covered in organization-wide policies and procedures. The extent to which the risks associated with sustainability should be addressed might be defined in legal and regulatory instruments, an organization's ethics or as a requirement related to any associated contracts, where a customer might impose requirements on a supplier.

Establishing the sustainability of project solution, outputs and outcomes needs an assessment of the whole life cycle of the products of the project, including decommissioning or disposal. Sustainability requirements that relate to a particular project should be included in project's objectives and scope and be documented in requirements.

6.3.7 Security

Risks to the security of information, assets and people should be evaluated in order to ensure such risks are understood and any threats reduced to an acceptable level.

In particular, the project manager should ensure:

- a) sufficient resources are provided to cover security needs;
- b) staff are aware of and trained to comply with security requirements;
- c) hazards are identified and preventative actions taken;
- d) security assessments are conducted; and
- e) security breaches are reported and recorded, and actions taken to reduce the risk of recurrence.

6.3.8 Power of stakeholders

Governance arrangements, where stakeholders have significant power to influence the success of a project, should be carefully defined to ensure such stakeholder interests are taken into account in terms of project strategy, decision making, risk and timescales.

NOTE Examples where stakeholders have significant power include industries or organizations with union representation and public sector projects where the consent of the citizens and or where statutory instruments are required for the project to progress.

6.3.9 Multi-owned projects

Multi-owned projects are those where multiple organizations share ultimate control of decision making and as such governance arrangements should be clearly and unambiguously defined and agreed to ensure each party is clear on their respective accountabilities and obligations. This agreement should define the relationships between the parties, including, but not limited to:

- a) assignment of the project sponsor and supporting project board members;
- b) the authorization points in the project;
- c) decision making authorities (scheme of delegation);
- d) assurance, reviews and audits;
- e) apportionment of risk and reward;
- f) reporting; and
- g) conflict resolution.

In addition, each party should ensure the project's governance is compatible with their own organization's governance arrangements.

Two or more parties might have similar or shared objectives and thus benefit from the outcomes of a single project. Sometimes the objectives are complementary: for example, one party needs a novel product developed for its own use, while another would like to develop the product so that it can be sold to other parties.

Joint ventures can provide significant benefits, but also have risks if the interests of parties diverge. Measures to reduce such risks here include:

- 1) formally agreed and documented governance arrangements;
- 2) a jointly agreed business case that assesses both the rewards and risk;
- 3) approval gates where participants can re-evaluate their involvement; and
- 4) procedures for reporting, independent reviews and dispute settlement.

These co-ordination activities are at the level of sponsors. Project board (or equivalent) meetings of all the representatives of the sponsoring organizations (with the project manager on hand to advise) are a way of facilitating consensus. Ideally, those managing day-to-day work on the project would communicate with a single project sponsor who represents a unified view of all the sponsoring organizations.

7 Roles and responsibilities

7.1 Typical roles in a project organization

All projects should have people who are accountable for:

- a) providing oversight, to ensure the project is aligned with the sponsoring organization's strategy and its outcomes meet the defined business need;

- b) directing the project in pursuit of the project's objectives;
- c) managing the project on a day-to-day basis, ensuring that the outputs are appropriate to the delivery of the desired outcomes; and
- d) undertaking the specialist work on the project.

Figure 7 shows a simplified project organization structure, highlighting the various project roles and their relationships.

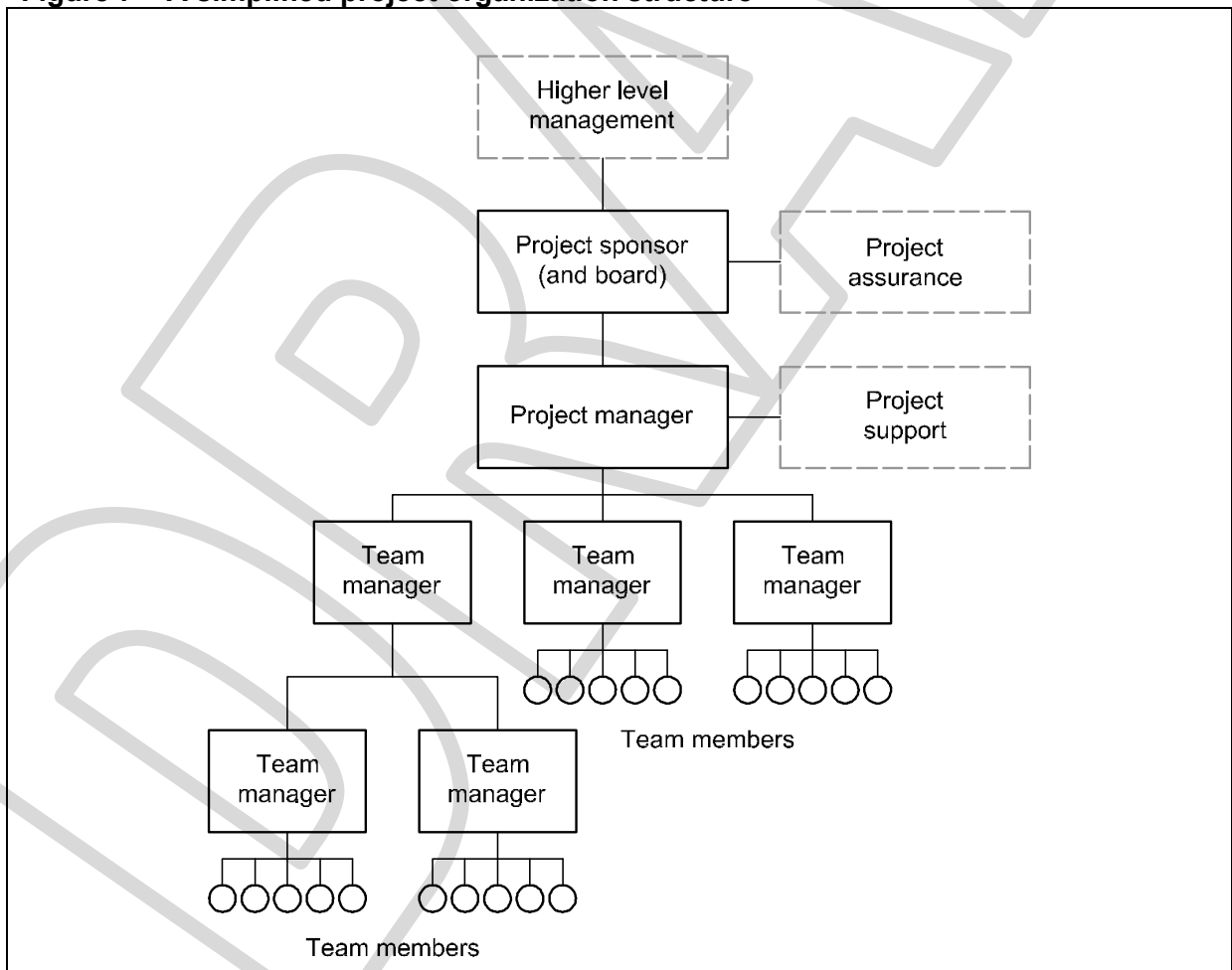
Roles should be defined in the project's management plan. The actual role titles used can vary from sector to sector and to suit the organization's own processes, methods, job titles, customs and practices, and might differ significantly from the generic ones given in this British Standard.

In addition, depending on the specific project, these roles can be supplemented by project support staff who are specialists in disciplines such as legal, finance, planning, risk management and procurement.

To ensure success, the direction and management of a project should be entrusted to individuals with a suitable level of skills and knowledge of project management and with certain personal attributes. Clause 14 defines the basic skills to look for when selecting appropriate role holders.

The accountabilities and authority delegated by senior management to the project role holders should be clearly and unambiguously stated, as the project team is often assembled from a number of different departments or separate organizations.

Figure 7 – A simplified project organization structure



7.2 Higher level management

Higher level management represents the organization for which a project is being undertaken. This varies depending on a project's context, as described in 4.3. With respect to projects, higher management is accountable for:

- a) ensuring the organizational environment is supportive of project sponsor and team, enabling them to achieve the project's objectives;
- b) identifying a project, assessing its initial viability and fit with the organization's strategic aims and needs;
- c) overseeing the project to assure it is being directed and managed effectively and is still viable;
- d) taking key project decisions or delegating them, as appropriate, depending on risk and impact; and
- e) reviewing the outcome from the project, once completed.

There should be a level of oversight of the quality of any outputs, including the application of any organizational constraints, e.g. policies, standards or components to be used.

NOTE 1 In the context of a programme, higher level management is represented by the programme manager; for portfolio management, the portfolio manager.

NOTE 2 Higher level management is also referred to as the sponsoring group.

7.3 Project sponsor

The project sponsor is accountable to higher level management for directing the project to ensure that the outcomes are delivered and the benefits for the organization are realized. This includes ensuring that the project always makes sound business sense, approving key deliverables and making decisions or recommendations at critical points in the project's life as required in the project's management plan.

The project sponsor is the primary risk taker. In a promoting organization, the benefits are normally driven by the strategic intent; in a contracting organization, the benefits are usually determined by the revenue and profit made for undertaking the work. The project sponsor should:

- a) ensure that a real need or opportunity is being addressed by the project;
- b) own the business case,
- c) ensure that the project remains a viable proposition (assurance);
- d) ensure that assurance activities are undertaken and initiate project reviews;
- e) ensure that the delivered solution matches the needs of the organization;
- f) engage key stakeholders;
- g) represent the organization in key project decisions;
- h) approve key project deliverables and project closure;
- i) resolve project issues that are outside the control of the project manager;
- j) establish and lead the project board (if one is required);
- k) appoint the project manager and facilitate the appointment of team members;
- l) facilitate the availability of project resources in order to achieve successful delivery; and
- m) act as champion of the project.

7.4 Project board

A project board (if required) should enable the project sponsor to realize the benefits and in particular to:

- a) monitor the project progress and ensure that the interests of the organization are best served; and
- b) provide a forum for assisting with strategic, cross-functional decisions, removing obstacles and for resolving issues.

The relative authorities of the project board and project sponsor should be defined.

NOTE Commonly used terms for project boards are steering group, steering board, steering committee or governance committee.

7.5 Project assurance

The project sponsor is accountable for assurance (see **6.2.3**), ensuring that the project remains on course to deliver outputs and outcomes of the required quality to meet the business objectives defined in the business case. Assurance activities may, however, be assigned to one or more persons (e.g. quality managers or assurance managers), who are independent of the project manager and team and who act on behalf of the project sponsor. This includes:

- a) recommending to the project sponsor that reviews or audits should be held;
- b) checking that user needs and expectations are being met or managed;
- c) checking that risks are being controlled;
- d) checking that plans are realistic and achievable;
- e) checking that the right people are being involved;
- f) checking that an acceptable solution is being developed;
- g) checking that the programme/project remains viable and the business need is being addressed;
- h) checking that the scope of the programme/project is not growing unnoticed;
- i) checking that legislative, regulatory and contractual requirements are being met; and
- j) checking that the needs of stakeholders are being respected.

7.6 Project manager

The project manager should be accountable to the project sponsor for the day-to-day leadership and management of the project involving the project team across all necessary functions. Depending on the size of the project, the project manager might be supported by a project management office. The project manager should:

- a) manage and lead the project team;
- b) mobilize the project team, with the agreement of appropriate resource owners;
- c) motivate and lead the project team;
- d) prepare the project's management plan
- e) prepare the project plan;
- f) define the accountabilities, work scope, and targets for each team within the project;
- g) approve the start of specific work items;
- h) monitor and manage project progress;

- i) monitor and manage risks;
- j) manage the resolution of project issues;
- k) manage the scope of the project and control changes;
- l) forecast likely benefits;
- m) deliver the project deliverables on time, to budget, at agreed quality;
- n) engage stakeholders; and
- o) manage the closure of the project.

7.7 Project support

Project support, if required, enables the project manager to undertake their accountabilities. This might take the form of a project management office, which can support single, usually very large, projects, multiple projects and programmes.

Depending on the size of the organization, project support might be established at different levels, e.g. at organizational level as a shared service, across the organization, portfolio level, programme level or project level. Project support at organizational level is often referred to as an enterprise project management office and supports organizational development, ensuring a strategic approach is taken within the project management function and establishing a centralized approach to project governance.

The size and composition of project support are usually set out in the project's management plan, and include at least the following:

- a) scope – defines exactly who it supports;
- b) authority – defines the level of decision making permitted; and
- c) responsibilities – sets out those functions to be carried out.

Project support's responsibilities might include some or all the following:

- 1) co-ordination between strategic and operational levels of the organization;
- 2) co-ordination between projects and programmes;
- 3) management of project portfolios;
- 4) status reporting to senior management;
- 5) advising senior management on project management, including input to strategic planning;
- 6) identification and prioritization of new projects;
- 7) development and implementation of a consistent methodology;
- 8) administration, including record management and standardisation of documentation;
- 9) identification and dissemination of good practice;
- 10) centralization of lessons learnt;
- 11) provision and management of a project management information system;
- 12) project monitoring, reporting and controlling activities;
- 13) resource management;
- 14) project auditing and post project review;
- 15) central provision of tools; and
- 16) internal consultancy and support (e.g. risk management).

7.8 Team managers

Team managers should be accountable to the project manager or to an intermediate team manager. The team managers should:

- a) be accountable for such work packages and deliverables as are assigned to them, ensuring that they are completed on time and to budget;
- b) liaise and work with other team managers in the carrying out of their work;
- c) contribute to and review key project documentation;
- d) monitor and manage progress on their delegated work scope;
- e) manage the resolution of issues, escalating any which they cannot deal with to the project manager;
- f) monitor changes to their work scope, informing the project manager of any which require approval;
- g) monitor risks associated with their work scope;
- h) be responsible for advising the appropriate team member and/or project manager of potential issues, risks, or opportunities they have noticed; and
- i) be accountable for directing and supervising the individual members of the team.

7.9 Project team members

Project team members are those people who work on the project. Team members should be accountable to the respective team manager for such activities and deliverables as are assigned to them, ensuring that they are completed on time, to cost and quality.

Issues, risks and potential changes should be escalated by the team members to the team manager as appropriate.

8 Project life cycle

8.1 What is a project life cycle?

The project life cycle is a mechanism used for structuring and controlling how a project moves from conception to completion. The purpose of the project life cycle is to ensure that the project has clear beginning, middle and end, ensuring that:

- a) a decision is made to start the project and that project initiation lays down the foundations for project success;
- b) work is undertaken in appropriately sized, manageable phases that enable the appropriate levels of governance, control and scrutiny to be applied;
- c) the decisions to continue to invest in the project and start each new phase of work is done in a mindful and controlled manner; and
- d) the project has a clearly defined and organized end point.

The project life cycle is a key tool for managing risk on projects. By dividing a project into phases and controlling the start of each new phase, an organization can limit the release of funds and commitment of resources (a phase at a time) and verify ongoing viability on a progressive basis. Supplier organizations have similar decision points, often built into the sales cycle where the organization decides whether to proceed with the bid or proposal and later, when the promoting organization decides whether to let the contract.

The project life cycle is supported by a set of project integration activities that describe what needs to be done to move through the project life cycle and provide a control cycle for managing the project (see 4.6).

NOTE "Stage" is a commonly used alternative to "phase". In this British Standard, there is no assumption regarding the use of the words "phase" or "stage" with respect to level in the work breakdown structure; for example, a stage is not assumed to be a sub-part of a phase or vice versa.

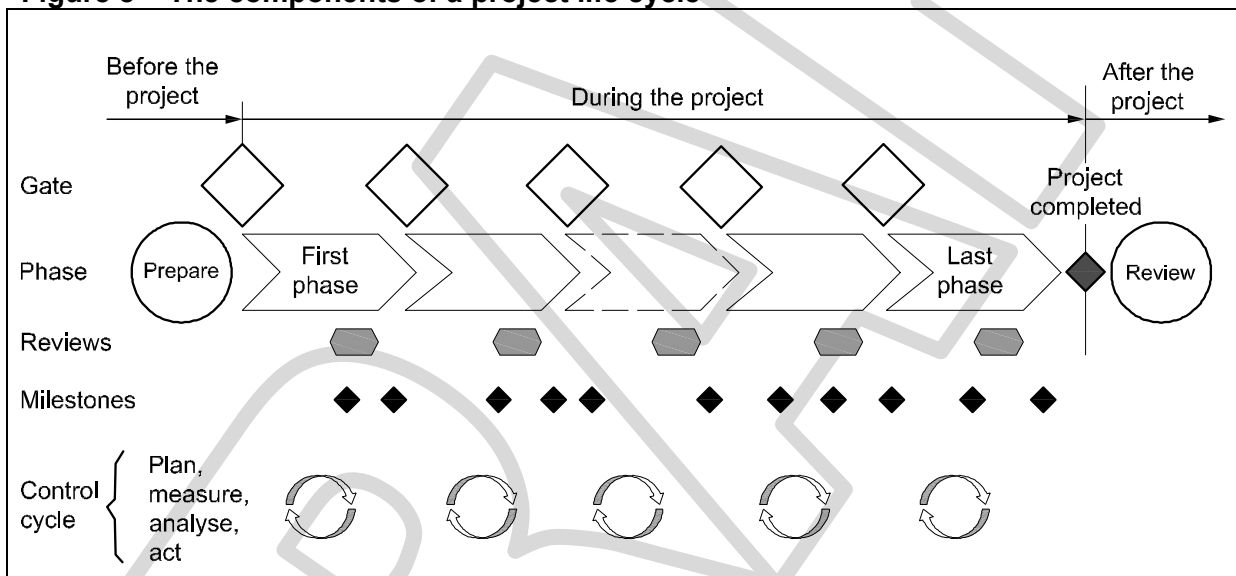
8.2 The components of a project life cycle

8.2.1 General

A project life cycle should have the following elements, which should be specifically identifiable in the project plan (see Figure 8):

- phases;
- gates;
- reviews; and
- milestones.

Figure 8 – The components of a project life cycle



8.2.2 Phases

A project phase is that part of a project during which a set of related and interlinked activities are undertaken.

All projects, irrespective of size and complexity, naturally move through a series of distinct phases from conception to completion.

Phases typically correspond to the primary states of evolution of the project's primary outputs and outcomes. The phases typically align with, or cover, the following types of project tasks:

- mobilization of the project team, planning the project and confirming viability, through establishing the business case for the project;
- investigations to confirm the feasibility of the project and then develop and refine options for addressing the business needs;
- development of the project outputs;
- transition of the project outputs into operational use; and

- e) initial operational use of the project outputs in the business in order to deliver the desired outcomes from the project and verify that they are sustainable.

Phases can include iterative design and development activities, to suit the delivery methodology being used. The number, type and scope of project phases depends on the type, size, problem domain and complexity of the project.

Whilst project phases are normally sequential, they can also overlap. For example, development might overlap with operational use if a formal decision has been made to move into the operational phase.

Start-up workshops for each phase provide a productive forum for the project team members and stakeholders to build collaborative relationships, clarify and align objectives and establish a common understanding of the challenges that lie ahead. End of phase workshops provide a forum for learning from experience to improve work in later phases or subsequent projects. For large and complex projects, independent facilitation might be useful.

8.2.3 Gates

A gate is a decision point for the formal authorization to start a new project phase. The purpose of a gate is to ensure that a project progresses through its life cycle in a controlled manner.

A gate should be used to:

- a) confirm the project is still needed;
- b) confirm the project's business case is valid;
- c) verify that risk is being managed and is acceptable;
- d) verify the criteria for starting the next phase have been met;
- e) assess whether the project is under control and within tolerance – for example, that the project is within time, cost and any other required tolerances;
- f) review and approve the outline project plan for the remainder of the project and detailed plan for the next phase;
- g) confirm that the project has adequate resources;
- h) consider the results of specific reviews undertaken during the phase; and
- i) make a decision regarding starting the next phase.

The decision at a gate might be to:

- 1) terminate the project;
- 2) suspend the next phase due to wider organizational considerations such as the reallocation to resources or the level of inherent risk;
- 3) defer the start of the phase while more information is collected, rework undertaken, or introduce change; or
- 4) start the next phase.

The decision maker at a gate should be the project sponsor or some higher authority in the organization supported by the steering group. A gate decision should not normally be made by the project manager but usually requires their input. See **6.2.2** for more detail on decision making.

8.2.4 Reviews

A review is a formal, scheduled assessment of one or more aspects of the ongoing project. They provide a mechanism to:

- a) integrate the outputs from multiple, parallel project activities and tasks; and
- b) undertake independent assurance of the some or all of the project.

Reviews can be held at any point in project life cycle and at any point in a phase. The outputs of key reviews undertaken during a phase would be typically considered as information which is essential to decision making at subsequent gates.

8.2.5 Milestones

A milestone is a key event selected for its importance in the project with zero duration.

Milestones are used to provide a high-level view of progress against a plan. There would normally be a milestone associated with:

- a) each gate at the start of a project phase;
- b) the start or end of significant reviews;
- c) the end of a project phase; and
- d) key events associated with work within specific phases, such as the approval of key deliverables; the successful completion of key activities; the achievement of recognizable outcomes; points of contractual significance; and the start of key activities.

Milestone achievement should be confirmed by the project manager; however, some organizations might require this to be done by a higher authority, such as the project sponsor.

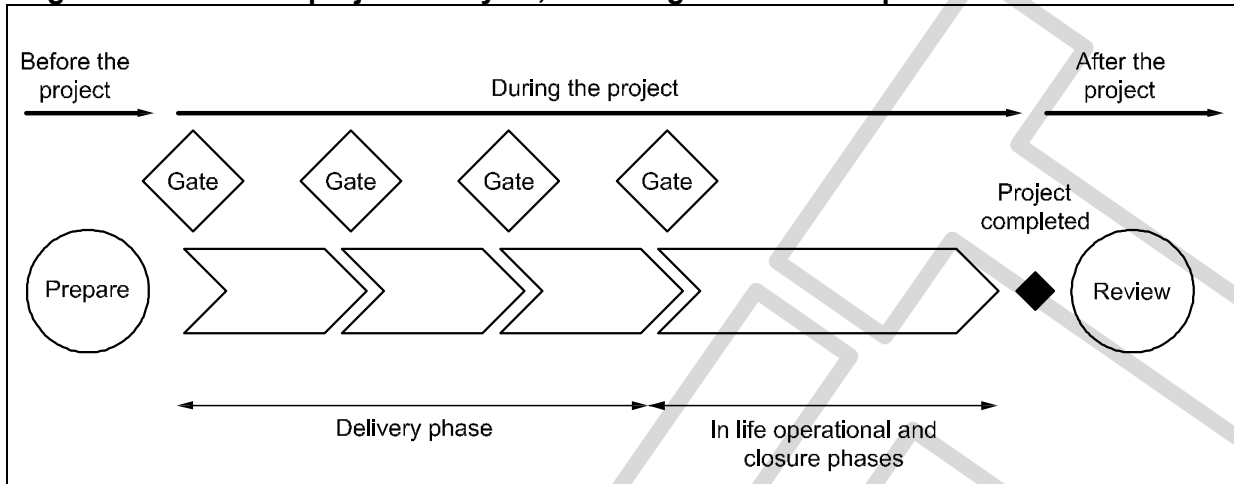
8.3 The extended project life cycle

Many projects are undertaken not only to create products, services or capabilities but also to operate the outcomes for a project. In such situations, the project life cycle is extended to cover the full operation of the service (sometimes called a product or system life cycle) as shown in Figure 9. In such situations, phases might cover the following.

- a) Investigative phases: options for solving the particular problem are investigated and a preferred option chosen.
- b) Development phases: a new capability is developed using a project as the delivery vehicle, taking into account the whole life needs of the organization, with respect to the use of the outputs, cost of creation and cost of operation. The last phase of the project typically overlaps the early operation of the new capability, in order to facilitate knowledge transfer and to be able to react to any operational issues uncovered. In a contracting situation, this is often defined in the contract (e.g. in construction's maintenance period).
- c) In-life operational phases: the capability is used and minor upgrades are carried out as "business as usual", which might itself include the following.
 - 1) Upgrade phases: more significant upgrades to extend the product life are undertaken, often using a project as the delivery vehicle.
 - 2) Disposal, retirement or withdrawal phases: the capability is withdrawn, retired or decommissioned when it is no longer needed. This is often complex and also requires a project approach.

As there could be various elements occurring simultaneously, with numerous interdependencies, co-ordination is likely to be required and therefore such projects might be better managed as a programme.

Figure 9 – Extended project life cycle, including in-life and disposal activities



8.4 Recognizing different project life cycles associated with the same work

In larger, more complex projects, projects are often embedded within projects. For example, when two organizations establish separate, but interfacing projects, such as between a customer and a supplier (see 4.3.3). This can become increasingly complex where the customer's project is supported by a number of suppliers, each of whom might see their part of the customer's project as a project in its own right, looking after the supplier's business interests. This might have implications on governance, especially decision making. It is therefore possible that different parties in such a complex relationship might be working to different project life cycle models.

Even within a single organization it can be effective to divide a project into a number of sub-projects, each of which might have its own life cycle, and which are co-ordinated through dependency management. Such situations are tending towards becoming programmes and managed accordingly.

9 Commissioning a project

9.1 Preparing for a project

In order to have a controlled start to a project, higher level management should ensure preparatory work is carried out prior to the formal start of the project to develop a brief explaining the reasons for the project and the expected outcomes. This activity can take a number of forms.

- a) For internal projects, commissioning can be part of ongoing corporate management as part of portfolio management.
- b) For programmes, the projects can be identified as part of programme initiation.
- c) For contracting organizations, the project can start with the invitation to bid or tender.

In all cases, higher level management in the organization should identify a senior manager (project sponsor) who is accountable for the realization of the benefits, and who establishes the project's objectives. The result of this work should be a statement of the business objectives, expected outcomes and outline justification for the project. Expected timescales and costs to deliver the project can also form part of the information required prior to the first project gate. This information should be used as the basis for a decision at the first project gate to start the first phase of the project (see 9.3).

Key in this activity is the project completion criteria (sometimes called exit criteria) which should define when a project can be declared complete. This usually relates to the delivery

of an output or outcome, operating to a prescribed level. It might also relate to the delivery of specific performance indicators or benefits.

Such criteria might change as the project proceeds and any changes should be managed through change control (see **13.2.4**).

NOTE The document that outlines the project can be called the project brief, client brief, charter, terms of reference, concept or proposal.

9.2 Overseeing a project

Although the project sponsor is accountable for the overall direction of the project, higher level management should satisfy themselves that the project remains likely to achieve its objectives, still meets the organization's needs and that the risks are acceptable. This is typically through:

- a) involvement in key decisions;
- b) periodic reporting;
- c) assurance reviews and audits; and
- d) ad-hoc escalations and interventions.

While many decisions can be delegated to the project sponsor, it is often more appropriate for higher level management to retain some decisions themselves, such as at gates, as factors outside the project, such as market environment, availability of funds or resources, can only be made at a higher level, due to its impact on other projects and work.

Higher level management should also keep the project sponsor updated on the project's wider context, providing guidance and direction when needed or requested.

Higher level management should ensure that the project sponsor has sufficient time to carry out their project accountabilities effectively.

NOTE See **7.2** for higher level management's role with respect to overseeing a project.

9.3 Approving a project or phase within a project

9.3.1 General

The project's management plan should define who is accountable for decisions at gates or changing the status of a project.

Approving a project should comprise two aspects:

- a) approving the start of a project, new phase of a project and closure; and
- b) terminating, suspending or reinstating a project.

The purpose of approving the start of a project or phase is to ensure that the project and each phase of the project are initiated in a controlled manner and that the project is closed in a controlled manner, as follows.

- 1) For the start of the project (first gate), the project sponsor should initiate the gate review based on a project brief, in accordance with the governance arrangement of the host organization.
- 2) For subsequent gates, the project manager should make the submission, together with an up-to-date business case, project's management plan and project plan.
- 3) Closure happens as a result of the project being terminated (see **9.3.5**) or completed. Approval for closure is essential to ensure that the complete scope has been undertaken, stakeholders advised and any capabilities handed over to operational management.

The purpose of terminating, suspending or reinstating a project is to change the status of the project as a result of the project becoming unviable or risks being unacceptably high. It might be that the environment (internal or external) has evolved such that the project no longer meets its original business needs due to changing environments and technology.

Terminating a project is always an option and not normally a light decision to take. Terminating a project does not have to be viewed as a failure, but as a timely business decision.

Projects are suspended to enable time to consider a significant issue pending a termination or continuation decision. During this period, low-level work often continues but commitments for major expenditure are normally delayed. Termination means the ceasing of all work and controlled closure of the project. Reinstatement of the project can result from a suspension if circumstances are such that it is viable to continue. This is often accompanied by a formal change to adjust the project plan to reflect the conditions which triggered the suspension. At any point in time a project might be on one of a number of states (status):

- proposed: the project has not started;
- in progress: the project has been approved and work is being undertaken;
- on hold/suspended: significant work has been halted while an issue is investigated;
- terminated: the project has been closed early as a result of a major issue; and
- completed: the project scope has been completed.

Formal approval should be required to ensure that funds and resources can be made available and committed to the project. The approving body should be informed of any potential risks and disadvantages so that a balanced decision can be made about the project's future.

Authorization might be given for the whole project, project phase or for work up to specified milestones or financial limits, at which point further authorization might be dependent upon satisfactory progress and verification that the objectives are likely to be achieved. In most organizations there can be several levels of approval, each management level having authority to approve capital expenditure to a predefined financial limit. Authorization for larger expenditures generally moves higher up the management hierarchy with ultimately all major projects requiring authorization by the main board level (or equivalent).

No substantial work, commitment of resources or expenditure should be permitted without prior approval. Small projects might be approved by a senior manager, but major projects should be submitted to higher level management level for authorization. Applications should be presented in writing, in a standard form, for approval by the decision maker(s).

Project size and importance might not just be related to financial parameters. Other measures of importance might dictate which projects need higher level management approval and a senior sponsor appointed to oversee co-ordination between multiple projects. It might be that a low cost project is of such critical importance to an organization that it should be exposed to the most rigorous approval at the most senior management levels for authorization.

9.3.2 Preparing for approval

The documentation, usually prepared by the project manager for the project sponsor, required to support approval to start the next phase of a project varies considerably but should include the following information:

- a) a brief written description of the project, its outline business case and benefits, using illustrations and models where appropriate;
- b) financial data concerning the cost of delivering the project, if necessary broken down by phase;

- c) where applicable, the expected revenues, operating costs, projected return on capital employed and cost benefit analysis;
- d) a recommended project schedule showing the main phases of work, key interdependencies and key milestones with particular attention to dependencies outside the control of the project;
- e) the human and physical resources needed to deliver the project;
- f) a realistic assessment of the business, cost, schedule and technical risks involved; and
- g) a forecast of the effect of the project upon the operation and strategic plans of the sponsoring organization.

9.3.3 Applying for approval to start a project or phase

The project sponsor should make a formal application for approval of a project before the start of any phase, within the constraints of any higher level delegations or authority. The application should be comprehensive and realistic; they should be recorded in an appropriate form for approval by the decision makers. In some cases, the project sponsor might be the decision maker in which case, this activity is not needed.

9.3.4 Formally approving a project or phase of a project

Organizational policies or procedures might define who the decision makers are for a project and for each gate within a project and what criteria should be met. In the absence of any organizational standards, the authorities should be defined in the project's management plan.

The decision makers should be satisfied that all the financial, technical and other relevant evaluation data have been taken into consideration. Given an evaluation that is satisfactory and within the existing policy constraints of the organization, approval to start a project phase should be given.

The decision makers should decide whether or not the project should proceed, given the funding required and competing demands for finance, human and physical resources. Approval might be conditional upon time and expenditure limits and receipt of satisfactory progress reports. Further applications for authorization might be required at specified phases of the project.

9.3.5 Terminating, suspending and reinstating a project

This activity comprises the tasks through which the status of a project is changed from "in progress". It comprises:

- a) reviewing the project with a view to changing its status;
- b) suspending the project;
- c) terminating the project;
- d) reinstating the project; and
- e) communicating the status change.

A formal review of the project should be undertaken to determine the likelihood of it achieving its objectives and to avoid any confusion and adverse reaction resulting from its suspension or termination. Only when such a review is completed, should direction be given by the project sponsor to the project manager. This might comprise:

- 1) continuing the project;
- 2) suspending the project, while further investigations are undertaken. Direction should be given as to what work should continue during this period and what should be delayed; or
- 3) terminating the project as soon as practicable.

Once a project is suspended, the results of any further investigation might trigger the decision to either:

- reinstate the project, in which case the project is restarted. As this often includes re-planning, it is usual for a formal change to be approved in order to create a new working baseline for the project; or
- terminate the project.

In all cases, the project manager should ensure that all relevant stakeholders are kept informed of the current situation as appropriate.

9.4 Reviewing project outcome and benefits

When sufficient time has elapsed for the benefits to be evident and meaningfully measured, the project sponsor should co-ordinate the undertaking of a review to determine:

- a) the extent to which actual benefits being realized match those predicted in the business case;
- b) whether the desired outcomes, such as operational performance and practice, match those predicted in the business case and value criteria expressed by the customer and other stakeholders;
- c) what corrective action, if any, is required to ensure that the outcome meets that defined in the business case and value criteria expressed by the customer and other stakeholders;
- d) whether all the customers' needs have been met; and
- e) any lessons that need to be communicated (see **13.3.5**).

Reviews can happen before the end of a project and/or after the project has been closed.

10 Directing a project

The project sponsor is accountable for directing the project to ensure it meets its objectives. Typically this involves:

- a) understanding the context within which the project is undertaken and its outputs are to be operated and in particular the attitudes of key senior level stakeholders;
- b) defining an appropriate brief so that the project manager knows what is expected of them. In some cases the project brief might be well defined and specific on what is expected. In other cases the project manager might need to flesh out the details in collaboration with the project sponsor;
- c) receiving and communicating any decisions and direction to the project manager and key stakeholders, as appropriate;
- d) requesting advice and guidance from higher level management, including escalating risks and issues which cannot be resolved at project level;
- e) receiving information and reports from the project manager and key stakeholders and providing advice and direction as required;
- f) recognizing the potentially uncertain, complex and dynamic nature of the environment within which the project is operating and help ensure robust decisions are made to help ensure the successful and timely delivery of project's objectives;
- g) ensuring the project's "success criteria" remain valid; and
- h) acting as a "bridge" between project manager and the wider organization or customer.

NOTE See **7.3** for the project sponsor's role with respect to directing a project.

11 Initiating, managing, monitoring and controlling a project

11.1 Initiating a project

11.1.1 General

Initiating ensures that a project is set up, defined and planned, and that the project team is mobilized and understands what is required.

As a minimum, all projects should have:

- a) a business case – justifying investment in the project;
- b) a project's management plan – describing the approach, methods and processes required to manage the project, including project organization;
- c) a project plan – describing the activities, schedule, costs and resources through which the project's objectives are to be achieved; and
- d) the potential to deliver a solution.

11.1.2 Establishing the project organization

The project manager should determine the roles and responsibilities of the project team and suppliers' representatives (if any), including the limits of their authority for any actions that they take. If necessary, written terms of reference should be provided.

See Clause 7 on roles and responsibilities.

11.1.3 Developing the business case

The project sponsor should ensure a business case is prepared, justifying investment in the project. The business case should comprise:

- a) business objectives for the project, together with references to any relevant strategy, business plan or feasibility reports;
- b) outputs and outcomes from the project, together with the criteria by which project success is to be measured in financial and non-financial terms;
- c) a statement of the feasibility of the project and a summary of any alternative options investigated; and
- d) financial and non-financial justification for undertaking the project, which might include:
 - 1) forecast of the financial impact of the project in terms of its probable costs and benefits, including any cash flow impacts; and
 - 2) whole life costs, which might include acquisition costs, tooling costs, stock costs, maintenance costs and disposal or decommissioning costs.

Where a project has a life of several years or more, the estimated cash flow should be discounted, to offset interest cost factors and derive an estimate of net cash surplus at net present value (NPV) that can be directly compared with the original investment.

In undertaking an analysis, it is essential that the sensitivity of the project to the various risks should be taken into account so that the authorizing body has a clear idea of the range of results that could be expected.

NOTE The information in the project's management plan, project plan and business case might be contained in as many documents as needed, to suit the scale of the project. For small projects, a single document might encompass all the required detail. Larger projects might require a number of separate documents. The naming of such documents are usually specific to the particular methodology being applied. Commonly used terms are project initiation document, project definition or project terms of reference.

11.1.4 Developing the project's management plan

The project's management plan describes the approach to managing a project. This should cover:

- a) the relevant legislation, policies and standards to be complied with;
- b) project organization including the core project team members;
- c) levels of decision making;
- d) the project life cycle being used for the project, together with gating and predetermined review points;
- e) how the integrative and support activities (see **4.6**) are to be undertaken;
- f) how specialist project delivery activities are to be undertaken (see **4.5**); and
- g) how access to project assets is controlled, appropriately secure and complies with legislation and other requirements.

The content, style and extent of the project's management plan should reflect the project context, governance framework, variety in the work and in the circumstances in which a project is to be undertaken.

NOTE Project assets can take a wide variety of forms ranging from documents, through to electronic records and systems, through to physical assets.

11.1.5 Developing the project plan

The project manager should co-ordinate the preparation of a project plan, which defines the work to be undertaken (scope), timescales, costs, resources and benefits for the project. It should comprise:

- a) summary of the project outputs and outcomes; the means planned to achieve them; and the completion or acceptance criteria to be used to determine whether the project has been delivered successfully;
- b) scope;
- c) project breakdown structure(s) to be used (e.g. work, cost, product, organizational, risk);
- d) work packages and the dependencies between them;
- e) schedule and resources;
- f) costs;
- g) benefits;
- h) planning assumptions and constraints; and
- i) risks (both threats and opportunities).

The project plan should be developed taking into account lessons from previous projects.

The project manager should ensure that the project team is aware of any relevant assumptions in the project plan and that they report to the project manager when these assumptions are at risk.

NOTE For additional information on planning, see **13.1**.

11.2 Managing a project

11.2.1 General

Managing a project should be undertaken by the project manager, supported by the team manager, project team and support roles, as appropriate.

NOTE See 7.6 for the project manager's role with respect to managing a project.

11.2.2 Initiating a phase

As soon as approval to start a new project phase has been received, the project manager should:

- a) notify all those concerned;
- b) engage and brief the project team managers and members, confirming the work scope and plan;
- c) review the risk, issues and change logs and/or registers, closing any which are no longer relevant and confirming ownership and mitigating action for each;
- d) add any new risks or issues which result from the review in light of the current situation;
- e) verify and update the stakeholder engagement plan; and
- f) clarify any administrative needs, including costs.

11.2.3 Monitoring and controlling the project

The project manager should monitor the progress of the project against the project plan and initiate any corrective and preventative actions to address issues or escalate as appropriate. See 13.2 for more detail on project control.

Timely monitoring and analysis of project data enables the project manager to address issues as soon as possible and take advantage of opportunities that might benefit the project. Time is a vital and non-recoverable asset, so the aim should always be to pre-empt situations rather than to respond to issues after they have assumed unmanageable proportions.

The project manager should ensure that, throughout the project's life cycle, risks (both threats and opportunities) are identified, assessed and updated and that project plans are modified as necessary.

The project manager should report progress against the project plan on a regular basis, at the frequency and format defined in the project's management plan.

Good communications between project manager and team manager are essential. If communication links are weak then problems can escalate, no matter how much information is available. Effective monitoring and analysis helps the project manager and team managers to understand the status of the whole project, the effect of their performance on the project's objectives and any risks that lie ahead.

The team managers should inform the project manager of any of their assigned work which is at threat. Similarly, the project manager is responsible for keeping team managers briefed on the current state of the whole project.

Lessons and experiences learned by the project team, which might be of use to other teams, should be recorded and managed (see 13.3.5).

The core information for monitoring and controlling the project should include:

- a) **Actual costs reported against planned cost and variances:** these should be identified and compared to variance thresholds imposed by the project manager. If a threshold is breached then the team manager should provide reasons for the variance and submit a

recovery plan stating the impact on cost, time and specification. The impact of current actual cost on project cash flow should be of specific concern to the project manager.

- b) **Time and cost at completion:** the team manager should provide a regular estimate of the time and cost at completion for each task. Although it is possible for the project manager to extrapolate existing data to provide such an estimate, the team manager should be given an opportunity to record a subjective view. Reconciling differences between the project manager's estimate based on actual data and the team manager's opinion provides a useful insight into real and perceived progress.
- c) **Quality:** the outputs and outcomes from the project should be verified and validated throughout the project (see **13.3** for more on quality).
- d) **Earned value:** the team manager should report performance regularly. Earned value measurement is one of the available methods of reporting performance. It can be used to calculate cost and schedule variances, which can in turn be used to calculate performance indices and objective projections at completion of cost, time or some other measurable value, e.g. labour hours or materials usage.

Earned value management (EVM) is a method for monitoring and controlling a project based on a structured approach to planning, cost budgeting/collection and performance measurement. It is a proven approach that provides benefits for the control of projects. It facilitates the integration of project scope, time and cost objectives in the establishment of a planned schedule and budget baseline and provides the means for comparing the work completed (achievement) against this baseline.

Earned value management indicates where deviations to the baselined project plan are occurring or likely to occur. These are early indicators of problems and give pointers as to what might happen to the project if actions are not taken. This enables managers to make appropriate judgements as to what corrective actions need to be taken in good time to deliver the project.

11.2.4 Instructing work to begin, continue or stop

The project manager should ensure that all work undertaken by the project team is initiated in accordance with the project plan.

The project manager should control the project by releasing or stopping work, using the work packages, based on the work breakdown structure. The means used by the project manager to start, continue or stop work should be clear and unambiguous in terms of the amount of money released, the nature of the goods and services required and the individual for whom the money is intended.

NOTE Work is usually released to a team manager as work packages for delivery management (see Clause 12).

11.2.5 Preparing for starting a new project phase

As soon as progress against the project plan indicates that a new project phase should be prepared for, the project manager should:

- a) plan the detail for the next phase of the project, within the constraints of the overall project plan where possible, seeking advice and direction from the project sponsor as appropriate;
- b) confirm the overall project plan, taking into account the detailed phase plan and any updates resulting from current progress and identified risks;
- c) check with the project team that the project plan is still valid, complete and relevant;
- d) verify that the business case for the project is still valid, bearing in mind the revised draft plans;

- e) take advice and direction from the project sponsor, including any rework of the plans and business case to improve project viability; and
- f) initiate the request for approval to start the next project phase (see **9.3**).

11.3 Closing a project

The objective of project closure is to ensure that a project is closed down in a controlled and organized way and that all accountabilities relating to it have been discharged or handed over to the appropriate authorities.

Closure is the formal end-point of a project, either because it is completed or because it has been terminated. Termination might occur because the project is no longer viable or because the risks associated with it have become unacceptably high. The closure review should check that:

- a) the project scope has been completed;
- b) confirm that the planned outputs of the project have been handed over, where appropriate, to ongoing management and outcomes achieved, including transition of outputs into operational use;
- c) review the efficiency of the project in terms of meeting the planned time, cost and scope targets, taking into account any formal baseline changes;
- d) confirm that the anticipated benefits have been built into the organization's forecast performance;
- e) outstanding risks, issues and actions have been handed over to, and accepted by, the appropriate authority; and
- f) record and communicate any lessons which might be beneficial to future projects.

As far as the project sponsor is concerned, either the project has been completed and its objectives achieved, or the project has been terminated. In the latter case, this might be because the original need no longer exists, but if it does, the project sponsor should take action to address the unresolved need which initiated the project in the first place.

Following approval to close the project, the project manager should:

- 1) demobilize, dispose of or handover any remaining project facilities and assets; and
- 2) inform stakeholders of project closure.

12 Managing delivery

Managing delivery deals with the management of a work package. As soon as approval to start a work package has been received, the team manager should:

- a) review the scope of the work package and then plan the detailed work for the work package, engaging the team members as appropriate;
- b) take into account any required standards, the project context and risk; and
- c) request approval from the project manager for the work package definition and plan, undertaking any rework as directed.

On receiving approval from the project manager and the instruction to start work, the team manager should manage the approved work scope by:

- 1) managing the delivery of the work products, ensuring that each is reviewed and approved in accordance with the quality plan for the project (see **13.3.2**);
- 2) managing any procurement and suppliers;
- 3) monitoring and forecasting effort, costs, resources and schedule;

- 4) identifying any deviations from plans and seeking approval for such deviation;
- 5) identifying and engaging stakeholders;
- 6) reporting to the project manager and stakeholders;
- 7) managing and escalating risks and issues as appropriate;
- 8) identifying and raising change requests;
- 9) maintaining configuration control of the documentation and deliverables;
- 10) handing over completed and approved deliverables; and
- 11) obtaining confirmation of work package completion from the project manager.

NOTE See 7.8 for the team manager's role with respect to managing delivery.

13 Project support activities

13.1 Planning

13.1.1 Managing planning

13.1.1.1 General

The purpose of planning is to ensure that the outputs from the project are likely to be delivered in sufficient time, within cost and at the required quality, such that the project's benefits can be realized.

The project manager should be accountable for creating and using the project plan, assisted and advised as necessary by the project sponsor and project team. Although the need to plan is usually most pressing at the beginning of a project, the project plan should be regularly reviewed and updated, as necessary, throughout the project life cycle. The more planning done before significant contractual obligations are established, the less risk there is of failing to meet those obligations.

It is good practice to plan the next phase of a project in detail towards the end of a previous phase, whilst maintaining an outline high level plan for the entire project.

The project manager should continuously balance timescales against cost and risk, without undermining the likelihood of achieving the project's objectives. The scope should be further developed and refined during planning, usually revealing more information concerning task costs, timescales and risks. The project manager should analyse this information and understand the overall project cost profile, schedule and where the risks lie.

Project planning is an iterative exercise, as each element of the plan can influence the other elements. Project planning normally comprises the following activities:

- a) defining the approach to be taken and the scope required;
- b) developing the breakdown structures to segment the project into achievable work packages;
- c) determining the activities to be undertaken for each work package;
- d) determining the sequence for the activities;
- e) developing the schedule;
- f) identifying required resources;
- g) determining the costs;
- h) checking the viability of the project plan with respect to any constraints, the business objectives and residual risk; and

- i) monitoring ongoing viability.

These are described further in **13.1.1.2** to **13.1.1.10**. Figure 10 shows the planning activities and their inter-relationships. Planning is an iterative and integrating activity, which maximizes the likelihood that the outputs of a project would enable the realization of the expected benefits.

13.1.1.2 Defining the scope and planning approach to be taken

The scope for a project should be derived from the requirements and objectives which led to the project being created. Scope is an element of the project plan and as such, once approved comes under formal change control. Once the overall scope has been defined, the scale and complexity of the project should be evident, and an approach can be decided on how planning should be undertaken. Key in this is the selection of the method and tools to be used for planning and the form the project plan should take.

NOTE Methods can include those where the scope is fixed or where scope can be variable, such as in some agile approaches.

13.1.1.3 Developing the project's breakdown structures

The project scope should be divided into work packages to enable allocation of work to the project team and ensure accountability and control.

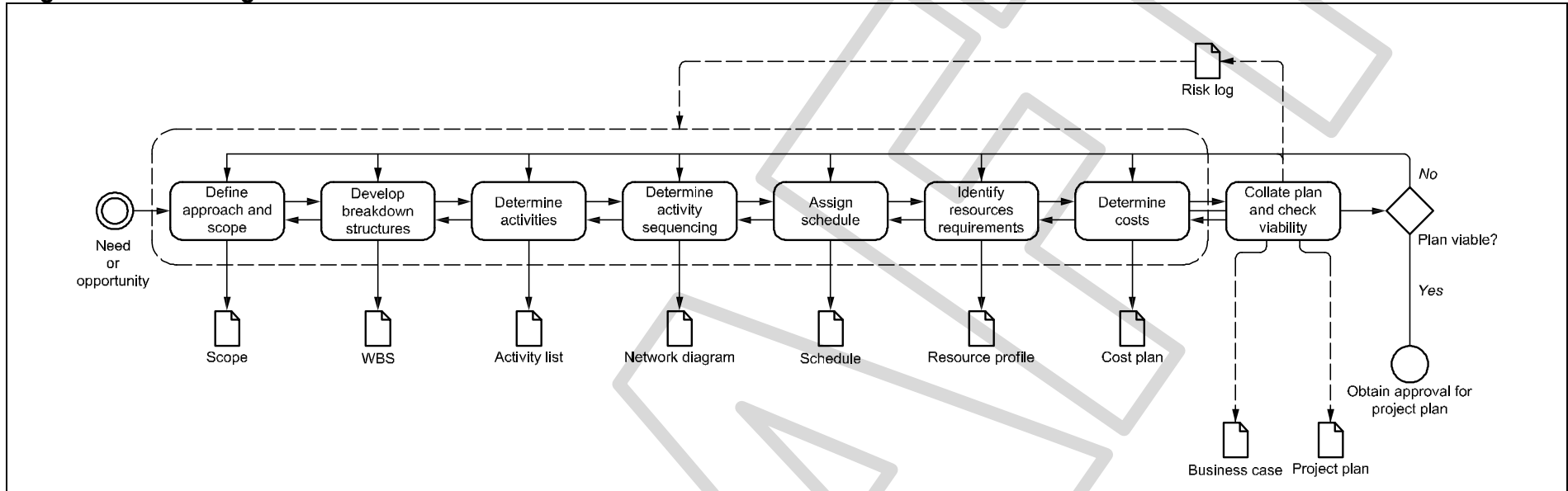
The work breakdown structure (WBS) is a hierarchical decomposition of the entire work that should be completed in order to achieve the project's objectives. It is most effective when each element of the structure includes the elements of scope, schedule and cost, and as such is essential to ensuring integrated accountability and control over project work. The project deliverables should be split into manageable units of work to generate a hierarchical structure of work packages. An existing WBS can be helpful in identifying activities for new projects, where similar work has been done in the past. A project WBS dictionary, with a short summary description of each work package recorded against a WBS code, might also be included. This dictionary should provide a useful glossary of work package definitions, as well as helping users to locate specific work swiftly.

A work package should include:

- a) a breakdown structure reference code;
- b) a summary description;
- c) a description of the work content;
- d) a list of key deliverables;
- e) an assessment of risks;
- f) performance measurement and completion criteria;
- g) timescales for the deliverables;
- h) a schedule of task dependencies and subsidiary tasks;
- i) inputs needed from other WPs and other external sources;
- j) a schedule of costs by cost element; and
- k) reporting requirements.

NOTE Whilst this clause specifically refers to work breakdown structure, other forms of breakdown structure may also be used as part of project planning to reflect the planning approach taken. Examples include: product breakdown structure, cost breakdown structure, organization breakdown structure. The same type of activity might take place at more than one point in a project, for example where several buildings are erected in one scheme. A generic work package might be produced which is then tailored for each instance.

Figure 10 – Planning activities



13.1.1.4 Determining and sequencing the activities to be undertaken

The key deliverables and activities for each work package should be identified. Task identification should begin by broadly defining tasks outlined in the statement of requirements and then expanding to a level of detail necessary and sufficient for inclusion in the project plan.

The logical sequence of activities should be determined, which can be represented in a network or precedence diagram.

13.1.1.5 Developing the schedule

The project schedule should be developed, taking into account the sequence of activities, estimates of duration and imposed time constraints.

This activity is influenced by the resources available and therefore it is normal to iterate between developing the schedule and assigning resources until an acceptable schedule is achieved.

13.1.1.6 Identifying resource requirements

Resource requirements should be identified against the activities. This enables a resource profile for the project to be drawn up that can be subsequently levelled or smoothed to ensure the efficient use of the resources.

Although the logical sequence of activities has an influence on a project schedule, the availability of resources is equally significant.

13.1.1.7 Determining the costs

The cost of the project should be determined, taking into account the scope, schedule and resources.

The total costs of project should be expressed in terms of their separate elements, e.g. in labour or purchases. It is often useful to decompose a task according to its cost elements.

13.1.1.8 Checking the viability of the plan

The project plan should be checked to verify that the project is viable and is likely to achieve the business objectives and that the risks inherent in the plan are acceptable.

At each iteration, the estimated workload and costs should be refined as necessary. It is essential that estimates, if not originated by the team manager, are sanctioned by the team manager. The project manager should not accept an estimate for a task from a third party who is not responsible for the task. The project manager should gauge the acceptability of each estimate by comparison with past performance, and this might be possible only if previous work has been structured in a similar way.

13.1.1.9 Monitoring ongoing delivery and viability

Once a project plan has been approved, progress should be monitored and assessed to ensure that the scope, benefits, schedule, resource, cost and constraints are being maintained. These are described in **13.1.3** to **13.1.7**.

13.1.2 Managing change

The purpose of managing change is to prepare, equip and support organizations and individuals to change how they undertake a particular role or function and, where appropriate, behaviours. Changes might be minor, involving little intervention or can be significant, such as when an organization adopts an entirely new operating model.

The project team should have a vision for the future operating state (following the changes). The current operating state should be assessed together with the capability of those people required to work or be part of the changed state.

Structured approaches and appropriate techniques should be used to manage the required changes, continually assess the readiness of the impacted groups to accept the changes, and track progress towards achieving the future state.

Milestones representing the achievement of outcomes should be included in the project plan. Once a transformed operating approach has been implemented, it should be monitored to ensure behaviours and practices do not revert.

13.1.3 Managing benefits

The purpose of benefits management is to ensure that the benefits expected from undertaking a project are defined, measurable and realistic and, if realized, should enable the project to achieve its objectives.

The project sponsor, supported by the project manager and other specialists, as appropriate, should:

- a) define how benefits are to be measured;
- b) create a project plan showing the forecast realization of benefits over time;
- c) confirm that the benefits match the outcomes required in the business case;
- d) during the project, forecast the extent to which the benefits are likely to be realized; and
- e) if benefit realization starts within the period of the project, measure benefits actually achieved. This would be the case if an extended project life cycle is used (see **8.3**).

13.1.4 Managing scope

The purpose of scope management is to ensure there is unambiguous information that describes, in adequate detail, the work packages comprising the project. Where possible, reference should be made to supporting documents and supplier agreements in order to avoid duplication or conflicts of information.

The project manager should ensure that each work package is delivered in accordance with the defined scope.

13.1.5 Managing schedule

The purpose of schedule management is to ensure that the project work is undertaken in a timely manner and that risks of slippage are reduced to acceptable levels.

The project manager should:

- a) develop the schedule, working with the appropriate team managers and stakeholders;
- b) obtain commitment to the schedule from those accountable for the tasks;
- c) update the schedule to reflect progress and approved changes; and
- d) identify risks and issues which might cause the project to slip and take corrective action, as appropriate.

The schedule can be presented as an outline or detailed bar chart that might be based on a critical path analysed task network. A consolidated list of all deliverables ordered by time and by accountable owner can provide a useful focus for the project team as a whole.

Tasks can be described as either critical or non-critical. This means that task interdependence needs to be understood accurately. If a critical activity exists within a task then that activity might need to be broken out as a separate task.

The progress of each activity should be measurable. Progress on tasks with extended durations and few discrete deliverables can be difficult to assess. Ideally tasks should be defined at a level where objective measures of progress can be applied. Thus short tasks, or

long tasks with regular deliverables, would normally provide an adequate basis for measuring progress.

NOTE 1 Most project planning tools use task start dates, durations and dependencies to calculate how much additional time is available, also known as float, before the task becomes critical, i.e. zero additional time available.

NOTE 2 The schedule forms a key part of the overall project plan, the others being cost, schedule, breakdown and scope.

13.1.6 Managing resources

The purpose of resource management is to ensure that the resources required for the project are available in sufficient numbers, at the correct skill level (in the case of human resources), and at the right time.

The project manager should ensure that each team manager is planning for and managing the resources required for each work package, in particular the following tasks.

- a) **Identifying resources required:** the team manager should understand what resources, at what levels of assumed efficiency, are required to perform the task before making a commitment. Resources can be in in-house labour, or in goods and services procured from an external source. Resource management is a related, but separate, discipline to project management, and the project manager need not understand the nature of the resource required to undertake a task, only how the application of this resource translates into time, money, performance and risk. This separation of duties might appear unnecessary, but the team manager should be allowed the freedom to apply whatever resource is appropriate to the task, providing the timing, cost and performance of the project deliverables are not jeopardized.
- b) **Identifying available resources:** the team manager should understand the availability of resource needed to complete the task as described in the scope. Resource is often not dedicated to specific projects and, in these circumstances, the team manager should know what competing demands there are for the resource, when they are going to be made and with what priority.
- c) **Balancing load with capacity:** the team manager should understand the resource demand profile based on all sources of demand. Time and cost estimates should be given to the project manager when the team manager is satisfied that there are sufficient resources to satisfy the demands of the project.
- d) **Reserving and allocating resource:** in the latter stages of this iterative activity, the scope becomes progressively firmer until the point is reached when the project manager accepts the offer from the team manager and asks for resources to be reserved pending a formal instruction to start work. When the instruction to start is given, the team manager should allocate the resource.

13.1.7 Managing costs

The purpose of cost management is to ensure that the project outputs are delivered within the planned cost constraints, in terms of both total cost and cash flow, such that the overall objectives of the project can be achieved.

The project manager should:

- a) develop the cost plan, working with the appropriate team managers and stakeholders;
- b) obtain commitment to the costs from those accountable for the tasks;
- c) update the cost plan to reflect progress and approved changes; and
- d) identify risks and issues that might cause the project to over-spend, and take corrective action as appropriate.

The cost plan can be presented as a consolidated table that is based on the work packages and tasks in the scope and schedule plans.

Each work package can be decomposed into different categories of costs, covering labour and non-labour elements.

13.2 Control

13.2.1 Manage processes and methods

Processes and methods detail the practices to be used for managing a project throughout its life cycle. Methods provide a consistent framework within which project management is carried out. Processes cover individual aspects of project management practice often as part of a method. The use of a method has a variety of benefits, including providing a consistent approach to project management within the organization, leading to better project performance.

13.2.2 Managing risk

The purpose of risk management is to ensure that the project's objectives are likely to be achieved. It should include both threats and opportunities.

Risk management should be undertaken throughout the project life cycle and at all levels in the project team, with clear escalation routes, in the event that the risk cannot be managed at the level it was identified. The work breakdown structure can provide the basis of such escalation routes. The accountable manager should:

- a) determine, as part of the project's management plan, how risks are to be managed;
- b) confirm risk context and business objectives;
- c) identify the risks to meeting the project's objectives;
- d) analyse and classify risks;
- e) evaluate and prioritize risks;
- f) develop risk treatment options, mitigation actions and costs;
- g) determine which treatment option, if any, should be implemented;
- h) implement, monitor and update risks and risk actions; and
- i) escalate significant risks to higher authority for management.

The project sponsor is the primary risk taker, as it can never be certain that the anticipated benefits defined in the business case will be fully realized, however well the project is carried out. For example, market conditions can change unexpectedly. Even if everything goes according to plan, by the time the project reaches its end point, the output from whatever has been created might no longer be saleable.

Risk management is a key element in project planning and decision making and a core activity within project management.

Risk assessments should answer the following questions.

- 1) What and where are the risks?
- 2) What is likely to cause the risk?
- 3) What is the impact on the project's objectives if the risk materializes?
- 4) What is the probability of the risk occurring?

Once understood, management action can be taken by reducing the impact of the risk, such as by reducing the likelihood of the risk occurring or avoiding the risk by taking an alternative approach.

Some risks require contingency plans to be put in place. Expenditure on contingency plans is often provided for by insurance or through the creation of management reserves under the control of the project manager. Where more than one project is involved, a central contingency pool can be created and by this means a sponsoring organization can wholly or partly insure itself against the unexpected.

The risk assessments and response activities should be documented and integrated with the main project plan. They should detail who is responsible for each risk treatment action and for any other actions such as contingency planning.

13.2.3 Managing issues

The purpose of issues management is to ensure that events can be escalated to a suitable authority level to be managed.

Issues management should be undertaken at all levels in the project team, with escalation to higher levels to ensure the issue is addressed. Issue management involves:

- a) logging all identified issues and analysing them to determine whether the issue is a legitimate one. The impact the issue has on the project's objectives should be determined, and accountability assigned for resolving the issue;
- b) ensuring that the issue and its impact are investigated to determine possible ways for resolving it;
- c) identifying and logging subsidiary issues that might occur as a result. If necessary a change request should be raised, if the issue cannot be resolved within the project plan (baseline);
- d) ensuring that issues are monitored until resolved; and
- e) escalating issues to higher authority for management to ensure resolution.

Issues can be raised at any level in the project hierarchy; for example, a project manager might raise a project level issue to the project sponsor, and a team manager a work package level issue to the project manager.

13.2.4 Controlling change

The purpose of controlling change is to ensure that only necessary or beneficial changes are introduced. A change might affect the objectives, benefits, scope, schedule and cost baselines for the project.

Proposed changes should be identified, their impact assessed, an implementation plan produced and, if authorized, implemented in a controlled way. All related documentation should be updated.

The project manager should be responsible for the integrity of the project plan and should ensure that all changes to the plan are controlled. Such changes might be requested by the customer, sponsor or team managers. The planning approach outlined in **13.1** should be followed as rigorously for a change to an existing project plan as for a new plan. Where appropriate, it is essential that the project manager ensures that the current version of the project plan reflects the current contractual requirements in terms of time, cost, performance and specification.

The levels of approval for authorizing changes to the project should be documented in or referenced from the project's management plan.

The following guidelines should be used to control changes to the project.

- a) The project manager should ensure that the impact of any change is fully assessed by those team managers and stakeholders who could be affected, and that it is fully understood.

- b) The project manager should be responsible for the control of the project plan and for ensuring that all changes are authorized at the appropriate level.
- c) Any new version of a revised, agreed project plan should supersede all previous plans.
- d) Each version of the project plan should be allocated a unique sequential revision code so that previous plans can be easily identified and replaced with the latest version.
- e) The reasons for changes to the project plan should be fully documented and a cross-reference made to the revision codes. A log of such changes should be retained by the project manager.
- f) Changes to project's objectives and the project plan should be communicated unambiguously.
- g) Work should not be released from a draft project plan.
- h) No single item of work should be put in more than one project plan.
- i) Where a change to a project plan is minor and can be contained within the existing commitments of team managers, the project plan can be amended without reissue. Details of the amendment can then be given to all project plan holders by the project manager. Guidelines for deciding whether a change constitutes an amendment or a reissue should be documented in the project's management plan.
- j) Where applicable, the project manager, in consultation with a legal advisor if necessary, should be responsible for ensuring that the revised project plan does not compromise any contractual obligations.

13.2.5 Managing configuration

The purpose of configuration management is to ensure that each deliverable from the project is identified in terms of status and version, and that the composition of all higher level outputs is known in terms of their constituent deliverables or components.

Configuration management should be used to control the physical and functional characteristics of a product or service through documentation, records and data. Good configuration management practice ensures that changes (variations) are implemented only after being authorized through the supporting documentation and not, as sometimes happens, with the documents being altered to reflect a configuration change that has already been implemented.

The configuration management discipline should be applied throughout a project. During the early project phases this might require an increase in management costs. However, cost savings during the project and in-life service and operations are expected to follow.

The project manager should establish and maintain the configuration of the outputs, to ensure that technical and administrative direction and supervision is applied to the following activities:

- a) configuration item selection, identification and documentation;
- b) configuration control;
- c) configuration status accounting; and
- d) configuration audit.

The project manager should prepare a configuration management plan that formally describes the scope, organization and procedures for configuration management and the points of contact responsible for configuration management.

13.2.6 Managing information

Projects generate and make use of significant quantities of information. Information management is the collection, storage, dissemination, archiving and appropriate destruction of project information. Information is used to make timely decisions on the project.

The information which needs to be managed should be defined. This might include information relating to the solution and its development, project plans, progress assessments, reviews and audits, contracts, reports and communications. Information should be recorded on receipt, validated as correct, securely stored, distributed and retrievable by those who need it.

13.2.7 Managing reporting

The purpose of reporting management is to ensure that all project team members and stakeholders are aware of the current status for the project and the outlook for the future, in particular, regarding the achievement of the project's objectives.

The project's management plan should define what reports are needed and at what frequency to meet the requirements of the sponsor, contractual obligations and the level of information that the project manager decides is necessary to control the work. In general terms, the team manager should be responsible for informing the project manager of any changes to the information contained in the scope, e.g. changes to risk assessments.

The project manager should co-ordinate reports submitted by team managers and analyse the information provided. The project manager should ensure that, when appropriate, visual aids, such as a consolidated bar chart for the schedule, are kept up to date. The relevant team managers should be kept informed of changes to the critical and the estimated cost and time at completion for all permutations of tasks in the plan. The overall pattern of risk for the project should be analysed and reported to decide where to concentrate management effort to best effect.

The project manager should report to team managers any risks that are identified through analysis of the plan and should ensure that the team managers have appropriate recovery plans in place. The project manager should also co-ordinate all project reports for the sponsor and key stakeholders.

The following specific aspects of reporting should be addressed at project and work package levels.

- a) **Performance/progress status:** the actual and forecast date of achievement for the deliverables defined for the task. At project level an evidence-based assessment of the likelihood of achieving the project's objectives should be provided.
- b) **Schedule status:** the estimated time of completion for each task. This information should be consistent with the progress of deliverables. Forecast start or finish dates that are later than the most recent planned start or finish dates should be shown separately, as any slippage in these dates might affect the project completion date.
- c) **Cost status:** the actual expenditure and committed expenditure to date for each task. The estimated cost at completion should also be reported.
- d) **Quality status:** this might contain metrics describing or indicative of the quality attributes of the outputs that might affect the form, fit or function of the deliverables.
- e) **Risk and issues exposure:** any changes in the status of identified threats to the achievement of objectives, together with any newly identified threats, opportunities or issues. An overall risk rating and exposure, in monetary terms, might also be provided.
- f) **Change control status:** a listing of the proposed changes and changes currently being evaluated, together with their status, to indicate how far the change has progressed through the change control process.

- g) **Exception thresholds and variance reporting:** the rules for triggering exception reports should be based on margins (tolerances) applied to the forecast time and/or cost at completion, or actual time and cost status and derived earned value statistics. An exception report should contain a statement of the actual or forecast exception, a description of the planned recovery action and an estimate of the threat to the project's management plan in terms of time, cost and performance.

13.2.8 Engaging stakeholders

The purpose of stakeholder management is to identify and interact with all stakeholders in order to ensure that the objectives of the project are achieved.

The successful outcome of a project does not rely solely on effective technical management and planning, but frequently on the political dimension as well. This is particularly the case for a major internal change. A stakeholder is somebody affected by the outcome of or the undertaking of a change.

Stakeholder engagement should include the following.

- a) **Identifying stakeholders.** Stakeholders should be identified and analysed, gaining a greater understanding of each, determining how important they are to achieving the project's objectives, determining what is required from each, and understanding the relationships between them.
- b) **Planning stakeholder engagement.** Having determined who the stakeholders are, both as individuals and as groups, a means of engaging them should be planned. Stakeholders fall into three broad groups: positive stakeholders, who are well disposed to the project outcomes, and negative stakeholders, who are antagonistic to the project's outcomes and might work to undermine its objectives. In addition there might be people who appear neutral to the proposition. For each stakeholder, determine how each should be engaged in order to either address their negative feelings or harness their positive attitudes. Identify the activities, resources, funding and time required to do this work. It is useful to use quantitative measures to determine how well stakeholders are engaged. Such metrics can be very simple (e.g. the level of attendance at user group or stakeholder forums), or they can be more sophisticated, relying on statistical sampling in the form of well-designed surveys.
- c) **Monitoring stakeholder engagement.** Validating the attitudes of stakeholders throughout a project is essential if the project's objectives are to be achieved. As time passes, attitudes can change. Some people, who were positively disposed, might become antagonistic and vice versa. Unless the project team keeps abreast of the situation, the engagement plan and activities can become misplaced or even detrimental. Monitor the impact of any communications campaigns. Having identified any issues, take corrective action, as appropriate. Use the supporting activities, such as managing risks or managing issues, in order to highlight particular problems. Stakeholder engagement activities end only after the outcomes of the project have been delivered. As such, stakeholder management is required throughout the project, starting in the investigative phases and continuing right through to the final phase of the project.

13.2.9 Managing communication

The objective in communication is to address the target audience, with a specific message, in a way that they are likely to find acceptable whether for instruction, to influence or for information. This can take many forms, including e-mails, letters and memos, poster campaigns, newspapers (internal, national and local press), internet bulletins and presentations (in person, web-broadcast, podcast, TV, radio). A key factor in communications is assessing the effectiveness of each communication in order to ensure future communications are more effective.

13.3 Quality

13.3.1 Managing quality

There are two aspects to managing quality in a project. There is the management of an organization's processes and procedures, ensuring that they are followed as laid down in relevant documentation. The logic being that if all projects follow the same processes and procedures a quality output should be delivered each time.

The second aspect is the delivery of the outcome the customer requires from the project. This involves formal and controlled management of the customers' requirements. Taking a structured and considered approach to break down the requirement set, evaluating potential solutions and then formally confirming the solution against the agreed requirement. Projects that have large numbers of requirements can employ systems engineering techniques to manage this process.

13.3.2 Quality of process

The purpose of quality management is to ensure that the outputs from the project are fit for purpose such that the project's objectives can be achieved. Quality management comprises quality planning, control and assurance.

Those engaged in quality management should:

- a) assess the quality of the deliverables and services against the appropriate standards and specifications;
- b) assess the compliance of the project team to any prescribed processes, methods or standards for undertaking the work;
- c) identify and document non-compliance with any quality requirements;
- d) report on the results of quality assurance activities; and
- e) ensure that corrective and preventative actions are put in place to address any non-compliances.

The quality plan should form an integral part of the overall project's management plan and should provide a quantified means of demonstrating that specific quality requirements are being addressed.

The organization sponsoring the project might have an applicable quality management system that is directed towards the control of those elements of the project. If there is no quality system, quality needs should be defined within the project's management plan. Quality plans should be developed in the early phases of the project and confirmed at the beginning of each subsequent phase. Before the quality plan is included in a contract as a technical requirement, it should be agreed by both the quality manager and project sponsor.

NOTE See BS EN ISO 9001 for further information.

13.3.3 Managing needs and requirements

The purpose of managing needs and requirements is to ensure the needs of stakeholders are understood and considered throughout the development of the solution.

Users' wants and needs should be documented; capturing, analysing and testing requirements. A clear and agreed expression of the requirements and their acceptance criteria should be used as the baseline requirement set, with subsequent changes being managed through formal change control (see **13.2.4**). Where changes are approved a new requirements baseline should be set. This is essential for project success, as this manages future stakeholder expectations and provides the agreed measure against which project success can be judged.

High-level requirements are established and documented during the early phases of the project life cycle; these high-level requirements are then decomposed, developed, scrutinized and agreed during subsequent phases.

Requirements should be written in such a way to emphasise "what" is required, rather than "how" it can be achieved. When it is not possible to provide quantitative measures against requirements and a more subjective measure is required, a formal approach involving the stakeholders should be established to ensure that these requirements are carefully monitored, and any proposed solution is deemed acceptable. This is particularly relevant when an iterative delivery approach is taken.

13.3.4 Solutions development

Solutions development ensures the outputs meet the requirements, in order to achieve the desired outcomes and realize the required benefits. It includes design and development of the solution together with verification that outputs have been built correctly and validation that the solution meets the requirements and business need.

Solutions design should explore the options of how the requirements can be met. The requirements should be progressively decomposed and then potential technical solutions that could meet the individual requirements defined and considered. The traceability of all requirements should be recorded ensuring that it is clear how the selected solution satisfies each requirement. Techniques such as value management methods can be used to explore and evaluate alternate solutions and assist with their selection. Consideration should be given to requirement trades, by understanding the impact on the performance, cost, time, risk and potentially safety aspects of the project. Where requirements are to be traded the project stakeholders should be consulted, with the requirement baseline only being changed if formal agreement is reached.

The overall solutions development needs to be undertaken using a defined process or method controlling how the various elements of the solution are to be integrated and eventually work as a whole. The approach adopted should look at the sequencing, delivery and integration of all the elements of the solution, including any special environments or facilities required.

The solution selected to meet the need, problem or opportunity should be verified against the requirements' acceptance criteria to establish fitness for purpose or conformance. The testing of any emerging solution can be continuous throughout the project life cycle. Verification ensures that the solution is being built correctly (testing against specifications) and validation ensures that the correct product is being built (testing against requirements). Typically, verification is used for contractual acceptance of a solution and validation is used to establish user acceptance of the project outcome(s).

13.3.5 Learning from experience

The purpose of learning from experience is to avoid repeating the same mistakes and help spread improved practices to benefit current and future work.

At the start of any project, those involved and key stakeholders should identify and apply relevant lessons from previous experience when planning the project. Throughout the project life cycle, lessons should be continually captured, evaluated and action should be taken to mitigate delivery risk and facilitate continual improvement of the final project deliverable. Project guidance, processes, methods, tools and training should be updated and these changes communicated with the wider project delivery organization.

13.4 Commercial

13.4.1 Managing procurement

The purpose of procurement management is to ensure that any products or services which are sourced:

- a) are of the appropriate quality;
- b) represent value for money;
- c) are delivered when required; and
- d) have the necessary documentation and document trail.

The project manager, through specialist team members if necessary, should:

- 1) determine the work packages which require procurement;
- 2) define the procurement approach that to be used for the products and service to be acquired (often called a procurement strategy);
- 3) select suppliers, usually against predefined selection criteria and in accordance with organizational policy;
- 4) define and close the formal agreement with the selected supplier;
- 5) undertake the obligations in the agreement, including payments;
- 6) monitor supplier performance and quality;
- 7) evaluate the supplier's deliverables and services;
- 8) accept delivery of the supplier's deliverables and services, ensuring delivery of all supporting documentation; and
- 9) integrate the acquired products into the project's output or infrastructure.

Typically, the key products and services to be procured are defined during the early phases of a project. Suppliers can take many forms depending on business needs, including in-house vendors (i.e. vendors that are in the same organization but are external to the project), fabricators, system developers and laboratories, and commercial vendors.

13.4.2 Managing contracted suppliers

Supplier management ensures appropriate level of oversight and performance measurement of a supplier from contact award through to contract close, and effective management of any changes.

Supplier management includes:

- a) contract mobilization;
- b) supplier performance management;
- c) contract administration; and
- d) contract closure.

Mobilization obligations should be understood by the parties prior to contract commencement and undertaken in accordance with an agreed mobilization plan.

A contract management plan should be developed, involving the supplier, defining how the contract should be managed in practice, including the processes and tools required to support contract administration, responsibilities and authorities, schedule of meetings and forms of communication.

The supplier's plan for delivering the contract should be checked to see that it reflects the contract obligations, including for scope, delivery dates and costs.

Suppliers should be monitored to ensure their continuing suitability to carry out the contract with the supplier's performance being verified to demonstrate conformance with the contract and delivery of obligations.

Contract related expenditure should be controlled to ensure that the supplier is paid in accordance with the contract for evidenced delivery of the contracted provision.

Contract changes should be controlled to ensure the requirements continue to meet the organization's needs.

Communications with the supplier relating to disputes should be conducted or followed up in writing to evidence actions taken by all parties and should take account of legal advice.

Contracts can be closed under two circumstances when:

- 1) the contract obligations of both parties have been met; or
- 2) the contract is closed early, in accordance with the contract's termination clauses.

Termination of the contract should be a last resort, only enacted after other provisions for the delivery of the contract have been exhausted.

When termination provisions are enacted, all measures to minimize the cost and impact of the termination should be considered.

On contract closure, the associated contract documentation should be archived in accordance with the organization's information retention policy and procedures.

13.4.3 Managing a contracted customer

For supplier organizations, who use project management to deliver their products or services (see **4.3.3**), the contract with their customer (or client) is critical. Customer management is the management of a contract, as seen from a supplier's viewpoint, and should provide an appropriate level of oversight to ensure the customer meets their obligations and that supplier, in return, delivers its obligations. The obligations should be understood by the parties prior to contract commencement and undertaken in accordance with an agreed contract management plan, which should define how the contract should be managed in practice.

Critical requirements in the contract should be included in the project plan and tracked to ensure they are met on time.

Contract related expenditure should be invoiced in accordance with the contract.

Contract changes should be controlled to ensure the requirements continue to meet the customer's needs and are formally approved.

Communications with the customer relating to disputes should be conducted or followed up in writing to evidence actions taken by all parties and should take account of legal advice.

Contracts can be closed under two circumstances when:

- a) the contract obligations of both parties have been met; or
- b) the contract is closed early, in accordance with the contract's termination clauses.

On contract closure, the associated contract documentation should be archived in accordance with the organization's information retention policy and procedures.

13.4.4 Managing finances

Financial management ensures the efficient and effective management of funds to accomplish the project's objectives. The level of project funding needed should be determined, in the short and long term including any that is required for subsequent in-life or running costs and should be based on the project plan, and in particular what the work might cost and the value of expected benefits. The timing of when benefits accrue drives the

financial benefits. Investment appraisal techniques (such as discounted cash flow and internal rate of return) can help to determine how the benefits can be best measured in financial terms. Once the amount and timings of finance are known the funds can be secured. The cash flow should be analysed to ensure the project is justifiable, or at least acceptable, in financial terms.

Sources of funding should be identified and secured; this might be through business loans, corporate savings, grants or from income received through the project itself. The financial management framework should be defined, including:

- a) financial accountabilities;
- b) levels of delegation for spending;
- c) processes to be used; and
- d) financial monitoring.

The financial management framework should be integrated with other project controls, such as for reporting, project life cycle and gating.

Financial reports should be reliable and provided to decision makers and to managers in a timely manner.

During the early phases of the project life cycle, funds might only be committed in principle, pending a more detailed understanding of the work. As work progresses through the life cycle, plans are defined in ever greater detail, with increasing levels of confidence, funds can be fully committed and approval given to commence work on each phase.

14 Skills and competencies for project management

14.1 General

The project sponsor, project manager, team manager and team members should be sufficiently competent and skilled to undertake some or all of the activities described in Clause 7, commensurate with their role and the complexity (see 4.7) of the activities they are managing. It is essential that the team as a whole has the required levels of capability to manage and undertake the work. Table 1 provides a suggested mapping between the roles in 5.2 and the skills and competencies described in 8.2 to 8.6.

NOTE 1 This is not intended to be a full competency model but a guide to the range of skills and competencies required for effective project management.

Table 1 – Typical competencies for project management roles

Typical competency area	Higher level management (7.2)	Project sponsor (7.3)	Project board (7.4)	Project manager (7.6)	Project support (7.7)	Team manager (7.8)	Project team member (7.10)
People management (14.3.1)	–	X	X	X	X	X	–
Leadership (14.3.1.2)	X	X	X	X	X	X	–
Stakeholder management (14.3.1.3)	X	X	X	X	X	X	X
Team building (14.3.1.4)	–	X	–	X	X	X	–
Conflict resolution (14.3.1.5)	X	X	–	X	X	X	–

Table 1 – Typical competencies for project management roles

Typical competency area	Higher level management (7.2)	Project sponsor (7.3)	Project board (7.4)	Project manager (7.6)	Project support (7.7)	Team manager (7.8)	Project team member (7.10)
Evaluation and decision-making (14.3.2)	X	X	X	X	X	–	–
Planning, monitoring and control (14.3.3)	–	–	–	X	X	X	X
Finance (14.3.4)	X	X	X	X	X	–	–
Procurement and supplier management (14.3.5)	–	–	–	X	X	X	–
Commercial/contractual skills (14.3.6)	X	X	X	X	X	X	–
Communication (14.3.7)	–	X	X	X	X	X	–
Negotiation (14.3.8)	X	X	X	X	X	X	–
Legal awareness (14.3.9)	–	X	X	X	X	X	–
Domain understanding (14.3.10)	–	–	–	–	–	X	X

NOTE 2 Competencies required by project support vary, depending on what functions they perform.

14.2 Relationships between roles and competencies

Each project management role has a number of key competence areas that an individual fulfilling that role should be skilled in. It is incumbent on the organization to ensure individuals are competent and able to maintain their competence and ensure that regular reviews are undertaken by (competent) line management to assess any skills gaps.

The level of complexity of a project has a direct impact on the skills needed of a particular role. As such, competences should be monitored for each role to ensure that the projects are managed skillfully to have the highest probability of success.

14.3 Typical competency areas

14.3.1 People management

14.3.1.1 General

Individuals should be able to motivate and enthuse colleagues by means of the following attributes:

- a) being able to work co-operatively and communicate effectively with people at all levels in the organization;
- b) being concerned for and having an understanding of people's needs;
- c) showing enthusiasm for the project and a constant personal drive toward achieving its goals; and
- d) developing the skills of and encouraging the individual project team members.

14.3.1.2 Leadership

Projects should, by their nature, be directed towards achieving a definite end result.

Individuals at all management levels should be able to stimulate action, progress and change through their personal behaviours, including:

- a) demonstrating initiative and being objective and results focused;
- b) displaying strong influencing and persuasive skills;
- c) delegating effectively;
- d) managing the effectiveness of the team as a whole and the contribution of its individual members; and
- e) being competent at running effective meetings and communicating.

14.3.1.3 Stakeholder management

Stakeholders are those affected by the project. This includes those involved in the undertaking of the project as well as customers, partners, suppliers, end-users and those whose activities are in some way be changed as a result of the project. The core skills set for effective stakeholder management includes:

- a) identification and understanding stakeholder needs;
- b) communication and application of appropriate media tools; and
- c) influencing and persuasion.

NOTE See also 13.2.8.

14.3.1.4 Team building

Team building refers both to the process of selecting members and creating the project team, and to encouraging and monitoring performance and good practice throughout the life of the project. Selection should be made according to the skill requirements that are important for undertaking the activities of the project; it is desirable to ensure a mix of personal characteristics across the project team.

The benefits of team building enables members to:

- a) show a commitment to both the project and the team;
- b) feel a sense of purpose and camaraderie;
- c) improve communications;
- d) enable better conflict resolution;
- e) increase job satisfaction;
- f) collaborate to create innovative solutions to project issues; and
- g) collectively ensure that project tasks are completed to the required standards.

A project manager and team managers should therefore have the ability to:

- 1) link, lead and motivate people;
- 2) recognize and show appreciation for good performance;
- 3) define roles, responsibilities, accountability and expectations;
- 4) review productivity and effectiveness;
- 5) keep the team informed and provide opportunities to escalate issues;
- 6) recognize politics or signs of disruption; and

7) reduce difficulties and obstacles.

14.3.1.5 Conflict resolution

Conflict can arise among individuals, teams, stakeholders or at an organizational level. It might relate to interpersonal issues, vested interests, values, organizational cultures and technical opinion.

A manager's role is to anticipate and prepare, avoiding conflict escalation through skilful negotiation or appropriate use of authority. Methods to manage conflict include:

- a) collaborating with the other party to determine a mutually acceptable solution;
- b) reaching a compromise where individual needs are traded;
- c) giving the other party what they want by accommodating their needs;
- d) avoiding conflict by choosing an alternative approach; and
- e) asserting personal views over those of the other party.

It should be recognized that conflict in a project can be constructive. Managed conflict brings concerns into the open, raises otherwise suppressed viewpoints and can resolve misunderstandings and uncertainty. This can enable positive working relationships to evolve. Unresolved conflict can become destructive, increasing uncertainty and damaging morale.

Where conflict cannot be resolved, escalation to a higher authority might be required, or specialists might be engaged to broker a resolution.

14.3.1.6 Training, education and development

A project organization should provide an environment that supports learning and development opportunities that meet the needs of the project team and the organization. People are responsible for their own learning and development, although the managers should also identify gaps in people's competencies and how best to address them.

Coaching and mentoring are useful tools to support individuals' developmental needs, both within a project and in relation to their wider career aspirations.

Learning is a lifelong activity, and all those involved in project management should be aware of the need to undertake continuing professional development and keep pace with changing standards, techniques and methods.

14.3.2 Evaluation and decision-making

Individuals should be able to evaluate alternatives and make authoritative decisions by means of the following attributes:

- a) being able to sift through and understand volumes of project data, identify important material and seek out any missing information, to make an informed decision on the facts presented;
- b) getting to the root of project issues, identifying key relationships, political implications and applying a pragmatic cause and effect approach to the decision process; and
- c) understanding the project's objectives, establishing the correct priorities and choosing the most appropriate course of action.

14.3.3 Planning, monitoring and control

Planning, monitoring and control skills include:

- a) understanding the importance of generating, setting and maintaining baselines for measurement;
- b) the ability to identify problems and opportunities;

- c) making the best use of available resources to achieve the project's objectives;
- d) encouraging the project team members to set personal objectives with respect to planning, organizing and time management methods; and
- e) being familiar with modern estimating, planning and monitoring tools and techniques.

NOTE See Clauses 9, 10, 11 and 12 for guidance on integration activities and 13.1 for guidance on planning.

14.3.4 Finance

Financial awareness involves:

- a) being familiar with financial and enterprise/project risk management techniques;
- b) having a broad-based financial knowledge, including the ability to understand company accounts;
- c) being familiar with cash flow and variance analyses, understanding profit and loss statements and able to develop financial models;
- d) being familiar with financial appraisal methods, such as discounted cash flow, internal rate return, payback period and return on investment; and
- e) being familiar with finance treasury activities including financial bonding, foreign exchange and taxation.

14.3.5 Procurement and supplier management

Individuals should be capable of participating in the development of the procurement strategy. They should also have an understanding of:

- a) different procurement approaches;
- b) contracts in a supply context;
- c) all phases of procurement; and
- d) supply chains and logistics.

NOTE See also 13.4.

14.3.6 Commercial/contractual skills

Commercial/contractual skills include:

- a) knowledge of applicable contract law, terminology and contractual precedence;
- b) ability to develop a contract strategy;
- c) ability to develop and implement a commercial strategy for the project;
- d) effective understanding and communication of contract requirements (including terms and conditions) to team members and managing compliance;
- e) effective contract management including contract change and resolution of non-compliances, claims and disputes; and
- f) ability to manage subcontractors.

14.3.7 Communication

Communications skills should cover the giving and receiving of information and should comprise:

- a) ensuring that project communications are consistent, understandable and unambiguous;
- b) demonstrating skills in verbal and written presentation;

- c) using the most appropriate presentation media and methods and tailoring the level of detail to a given audience;
- d) providing timely and meaningful responses to questions;
- e) communicating effectively with all stakeholders;
- f) giving clear, unambiguous instructions;
- g) listening skills; and
- h) understanding non-verbal communication.

NOTE See also **13.2.9**.

14.3.8 Negotiation

The ability to negotiate with internal and external stakeholders is an essential competence for project managers and team leaders.

To be effective in negotiation, individuals should be:

- a) capable of identifying stakeholders' stated, implied and/or latent needs;
- b) capable of identifying hidden agendas and political objections;
- c) proficient in preparing appropriate responses to situations as they arise and planning an appropriate negotiation strategy; and
- d) able to influence and persuade stakeholders.

14.3.9 Legal awareness

Individuals need to be aware of any statutory requirements that could affect the project.

Legal skills include:

- a) a knowledge of national and international procurement rules (including procedures, timings, categories and risks);
- b) a knowledge of the public law context of a project, such as power and money;
- c) a knowledge of an organization's internal rules and procedures for contracting (e.g. approvals, authorities);
- d) an awareness of key areas of law such as employment, intellectual property, property, contract, health and safety, or any others of particular relevance to the project; and
- e) an understanding of when and how to instruct legal advisors.

14.3.10 Domain understanding

The project manager should have an appropriate, but not necessarily specialist, understanding of the technical requirements of the project so that the business needs are addressed and satisfied. Team managers and team members, however, should have a more detailed understanding of the outputs from their particular activities.

Annex A

Agile methods and project management

Agile methods are useful in many types of collaborative working both within and outside projects. Some practices associated with agile methods are specific to software development but the concern here is those affecting project planning and control. One view of the agile methods in this context is that they help to reduce the risk of harmful rigidity in the definition of the requirements, such that final decision-making is made when there is a clear picture of the project context, requirements and practical challenges.

Projects that are planned in detail at the outset tend to be large and unwieldy, partly because a one-off requirements gathering exercise encourages stakeholders to identify as many requirements as possible at the outset.

Two methods for addressing this are:

- a) incremental – where development is broken down into a series of sequential work packages, each covering requirements, design, build and test and ideally producing a subset of the required output; and
- b) iteration – where, at an early point in the project, working prototypes which stakeholders can trial and suggest modifications to are developed.

These approaches not only mean that stakeholders receive benefits earlier, but help them to understand what they actually want. Requirements (sometimes called user stories) and scope can evolve. Time and cost are usually fixed at the outset with scope varying to meet time and cost constraints. Effective prioritization of the requirements ensures those with the most value to the customer are delivered first; less valuable ones can be deferred, where time and funds are available.

NOTE One system of prioritization rates each requirement as either "must have", "should have", "could have" or "won't have".

These strategies are only applicable to some types of work. They might be useful in IT development where code is relatively easy to change, but not in the creation of large physical constructions like bridges.

Agile practices focus on creating real-time communication between project stakeholders. For example, a knowledgeable product owner might be designated who acts as the sole authority on user requirements, thus avoiding lengthy requirements gathering. User representatives might work directly with developers creating "user stories" that are precisely mapped to delivered units of functionality and at the same time design the test cases that should be used to validate the design.

This sensitivity to the exact needs of users leads to greater user satisfaction, but requires users to be involved throughout. Local satisfaction is sometimes balanced by overall reductions in organizational efficiency with increased costs for the maintenance of a variety of non-standard products carrying out similar functions.

Agile practices are likely to be applicable to only a small subset of activities but nevertheless need to be managed within a broader context, such as a work package within a project or as work within ongoing business as usual. A common overall project management system is needed to co-ordinate these efforts.

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