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BSI Standards Publication

Project management –

Part 1: Principles and guidelines for the management of projects

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Contents

List of tables

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 64, an inside back cover and a back cover.

Foreword

Publishing information

This part of BS 6079 is published by BSI and came into effect on 30 September 2010. 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This part of BS 6079 supersedes BS 6079-1:2002, which is withdrawn.

Relationship with other publications

BS 6079 is issued in four parts:

- Part 1: *Guide to project management*;
- Part 2: *Project management vocabulary*;
- Part 3: *Guide to the management of business related project risk*;
- Part 4: *Guide to project management in the construction industry* [1)].

BS 6079-1 is intended to be read in conjunction with BS 6079-2.

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 standard has been revised to incorporate current technology, techniques and developments in the field of project management since the original standard was issued in 1996.

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 part of BS 6079 takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this part of BS 6079 is expected to be able to justify any course of action that deviates from its recommendations.

1) Published as PD 6079-4.

Presentational conventions

The provisions in this standard are presented in roman (i.e. upright) type. Its 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.

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

Project management has been practised long before the phrase or professional discipline came into existence since, by definition, any management activity is used to bring about change or a new order and has a definitive start and finish. Although projects can vary greatly according to their initiation, duration, complexity and in some cases continued development of the original project outcome, there are several principal features characterized by all projects. This part of BS 6079 aims to help people and organizations achieve a desired outcome of a project efficiently and effectively, as well as to contribute to the learning within projects and so continually improve their organization's project management capability. The principles provided in the part of BS 6079 are as relevant to small organizations and for small projects as they are to major organizations with multi-million pound projects spanning several years.

This part of BS 6079 provides guidance for:

a) managers in organizations that operate projects, to raise awareness of the challenges that are likely to exist within their own environment in the management of projects and to enable them to provide appropriate support for project sponsors, managers and teams;

b) project sponsors, responsible for:

- achieving the defined organizational objectives and realizing the required benefits;
- improving their ability to ensure that projects remain focussed on delivering the outcomes they were set up to achieve;

c) project managers, responsible for delivering the defined project outputs, to improve their ability to cope with the many problems that occur (only some of which might be foreseen) and manage the integration between the different disciplines taking part;

d) team managers and members, responsible for delivering the specialist outputs of a project, to enable them to understand the specific disciplines required when working in a project context and to enable them to use project techniques in the management of their work packages;

e) project support staff;

f) technicians etc., to help them to understand the problems that can occur in their project environment, and to provide possible solutions to those problems;

g) educators and trainers, who need to understand project management and the broad context in which the discipline is applied.

This part of BS 6079 aims to draw attention to the management challenges encountered in different project environments and to present possible approaches to these. Since there are no panaceas in project management, the approaches presented are intended to be treated as guidance only; they might need to be tailored to suit the particular circumstances for which they are being considered. The only certainty in a project is that, 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 will usually fail to achieve the desired outcomes.

1 Scope

This part of BS 6079 gives principles and guidance on the sponsorship, management, planning and undertaking of projects, and the application of project management techniques. It has broad relevance to projects in the public, private and voluntary sectors. It aims primarily to provide guidance for relative newcomers to project management and to act as a prompt for more experienced practitioners and those who interact with project teams.

The principles and guidance outlined in this part of BS 6079 are relevant to all sizes of organization, although they might not cover all aspects of every type and size of project.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 6079-2, *Project management – Part 2: Vocabulary*

3 Terms and definitions

For the purposes of this part of BS 6079, the terms and definitions given in BS 6079-2 and the following apply.

3.1 agile project management
method of management where the development emphasizes real time communication and timely delivery of work within incremental timeframes rather than months and years covered by conventional methods

NOTE This is often applied to development projects.

3.2 application area
category of projects that have a common focus related to a product, customer or industry sector

3.3 constraint
restriction that might affect a project

3.4 engagement plan
document that identifies all stakeholders, their issues, influence and responsibilities, and how the project team engages with them

3.5 issue
circumstance (event, lack of knowledge etc.) which has occurred and which might affect the success of the project, programme or organization

3.6 portfolio
grouping of an organization's projects, programmes and related activities

3.7 project sponsor
person accountable for ensuring that the sponsoring organization's business interests in the project are maintained and that the expected outcomes and benefits are realized

3.8 project context
environment within which a project is undertaken

NOTE The major elements of the environment may be based on the acronym PESTLE (Political, Economic, Sociological, Technical, Legal and Environmental).

3.9 project risk
effect of uncertainty on project objectives

4 Project management context

4.1 Projects as drivers of change

Projects are the engines of change. The motive for change might stem from a perceived shortage of funds, need to improve efficiency, changing patterns of demand, social pressures, technological advances, competition and alternative suppliers of goods or services. Those with management responsibility have to respond to these changes: those who do it successfully prosper; those who do not, decline. This applies equally in the public and voluntary sectors and in the private and business sectors.

As decisions are made within an organization to move from where it is now to where it wants to be, or needs to be, resources need to be committed to the achievement of that objective. The vehicle used for the journey from "today" to "tomorrow" is the "project" and the process for ensuring that this is directed and managed effectively is called "project management".

Organizations undertake an increasing number of projects of a progressively complex and interdependent nature, frequently crossing both internal and external organizational boundaries. Research suggests that there is a significant opportunity for organizations to improve their performance through effective project management. The realization of benefits on time, within predetermined cost and of the requisite standard and quality, is less frequent than it should be.

Although the concepts and basic principles of project management are universal, they have to be tailored and adapted to suit the particular circumstances of each organization and project. This guide describes a wide range of project management procedures, techniques and tools, and the user is advised to select those elements that are appropriate to the project being considered.

Senior management, through a project sponsor, is responsible for establishing the objectives and constraints within which a project has to be undertaken. Senior management should set realistic targets and ensure that adequate planning has been carried out and performance criteria established. Such objectives should be driven directly from the organization's business strategy and plan.

4.2 The benefits of project management

Project management has proved to be an effective and efficient way of directing and managing many types of change in organizations. It enables organizations to accomplish the following:

a) more efficient use of scarce resources;

b) improved affordability and better value for money;

c) the identification and management of project activities both at the early phases of a project and throughout its lifecycle;

d) the development of staff working on projects, helping to improve individuals' capability and hence the capability of the organization.

4.3 The characteristics of projects

Projects differ from other forms of work in several ways. They are a transient and unique endeavour. The principal features that characterize projects include the following:

a) their duration is usually predetermined (finite) with definite start and end dates;

b) what happens during the undertaking of a project invariably affects the subsequent events both inside and outside the organization;

c) the project organization is often temporary and can sometimes change through the project lifecycle;

d) all projects are undertaken in an environment of risk and uncertainty;

e) projects are seldom carried out in isolation, and can often interact with other projects and organizational entities.

4.4 Types of project

Projects can be categorized in various ways to identify appropriate methods of efficient and effective project management. Some examples of parameters that can be used to delineate project type are:

a) duration, e.g. three months or ten years;

b) total cost, e.g. £20 000 or £6 billion;

c) complexity, e.g. a simple task or a development involving numerous stakeholders, technologies, geographies and interdependencies;

d) approach to delivery, e.g. in-house projects, contracted out, joint venture or a combination of these;

e) market sector, e.g. consumer markets, government sector, defence sector, etc.;

f) often a function of the technical, organizational or administrative nature of the project focus, e.g.:

- strategic long term business transformation;
- research and development (R & D);
- administrative and procedural;
- capital plant and works;
- major engineering works on local and/or dispersed sites;

- planning and controlling mergers and acquisitions;
- one-off or repetitive building construction;
- new product introduction;
- major overhauls and planned maintenance;
- emergency response planning;
- plant commissioning and/or operation;
- information technology;
- office or factory relocation.

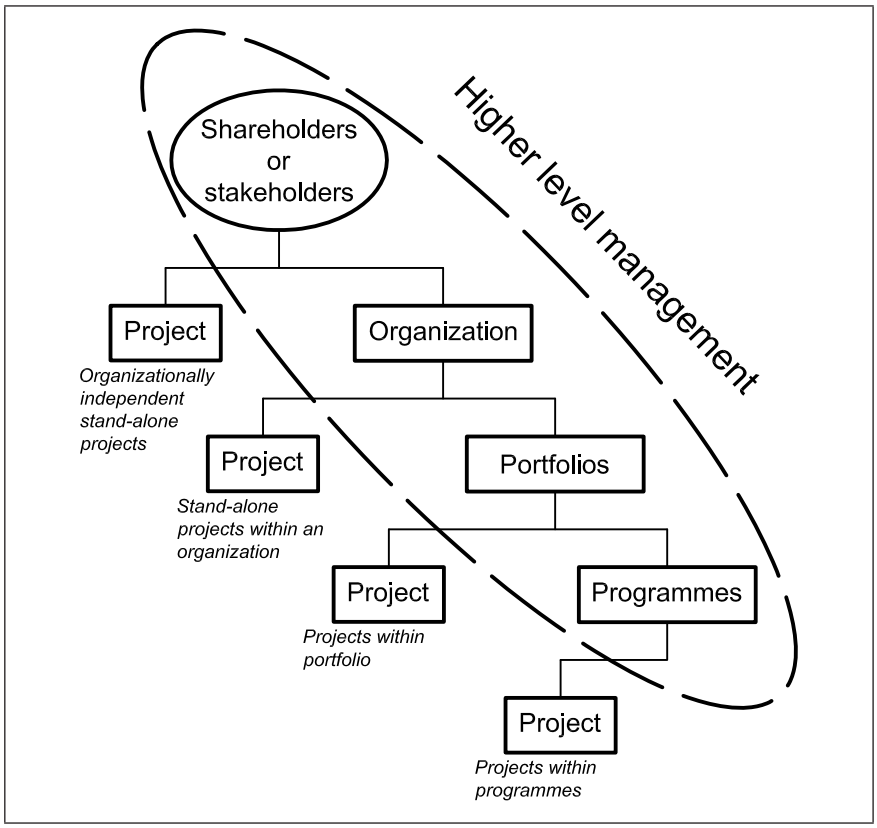
4.5 Organizational context for projects

4.5.1 Project ownership – organizations, portfolios and programmes

Projects can exist as stand-alone entities, where a company or other formal organization is set up solely for the purpose of undertaking the project. In such cases the ownership of the project comes from the shareholders or other stakeholders in the venture. In other cases, a project can be undertaken within the context of a larger organization, whether private or public sector, in which case the leadership team within the organization forms the sponsoring group. In both cases, the project is the vehicle for enacting the strategic intent of the sponsoring group.

As organizations become larger and the number of required projects grows, the need to group elements of the business for more effective and efficient management becomes apparent. In such circumstances, an organization often creates portfolios and/or programmes, centred either around services or products, or with specific business objectives. In these circumstances, the business interests of the organization are managed as a portfolio or programme, which determines the appropriate sponsor for the constituent projects. However, regardless of the context, the project and its mode of operating remain similar whether it is stand-alone, directly sponsored by an organization or part of a portfolio or programme. The only aspect which changes is where the sponsorship originates and therefore where direction comes from. Figure 1 shows the relationship between projects in the context of other management vehicles commonly found in organizations.

Figure 1 **Showing projects in different organizational contexts**



4.5.2 Projects in promoting and contracting organizations

Regardless of the organizational context, projects can be undertaken either:

a) **internally**, to fulfil a need within an organization, where the organization undertakes a project for itself in order to achieve its business objectives and realize certain benefits. For example, a manufacturer might wish to build a new production plant to produce certain product lines efficiently; or

b) **for customers**, where an organization undertakes a project, for payment. For example, a building contractor would undertake a project for the construction of a building, but might have no interest in the building once it is handed over.

There are primarily two type of organization commonly engaged on projects:

1) **promoting organizations**, which identify a business, strategic or political need, translate this into a set of objectives and, through project management, produce the outputs and changes to ensure those objectives are met. A promoting organization might let out part of the project to a contracting organization or supplier;

2) **contracting or supplier organizations**, which become involved in a project through a tender or similar sales channel, prepare a response as appropriate and then, if successful, undertake the contracted work.

Note that a promoting organization's sublet project might be a contracting organization's customer project. In both cases, the project has two distinct phases:

i) the **investigative phases**, when the promoter determines how best to meet the objectives and the contractor determines the bid design, cost and price;

ii) the **implementing phases**, when the promoter and contractor undertake their planned work.

The distinction between promoting and contracting organizations is not always obvious, especially in the case where a contractor undertakes the operation of any outputs from the projects as part of an extended project lifecycle. In more complex situations, the distinctions should be clear within the contractual arrangements and formal authorities agreed between the parties. Even where the promoting and contracting organizations are part of the same enterprise, the potential for this divergence of interests still exists.

4.5.3 Implications of project management for the structure of the host organization

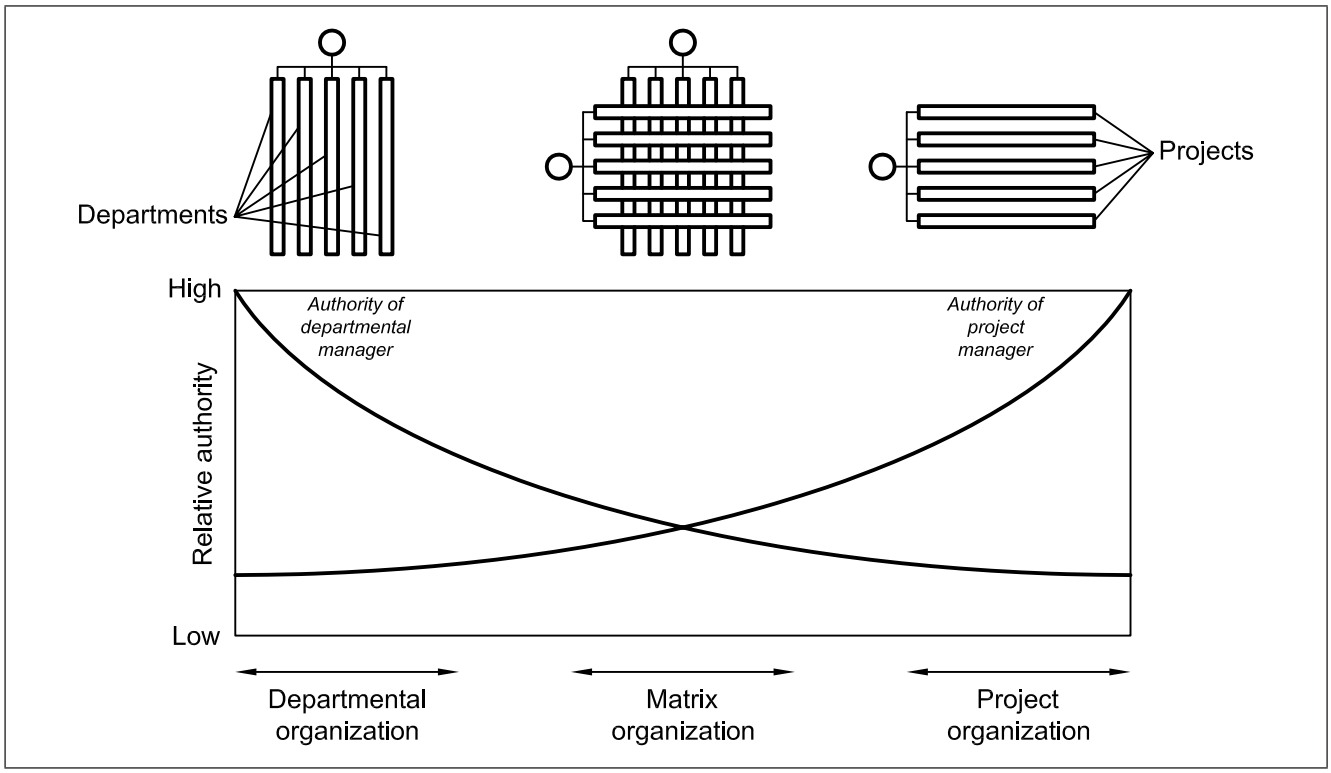
Projects can be undertaken within organizations that already have the structures necessary to support project work. Such organizations might be oriented exclusively towards projects or, more commonly, might adopt a matrix structure, with authority being distributed between the project team and the functional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

Functional areas are usually responsible for the quality of the deliverables and require clear scopes of work from the project manager (work packages). Project teams usually demand a positive commitment from the functional areas concerning task duration, costs and performance. Subcontractors can be treated in the same way as an in-house function, except that relationships between the subcontractor and the project manager will be subject to formal contract.

Project management structures are often integrated with traditional hierarchical functions. In such cases, because of the unique nature of projects, project management needs much higher flexibility than that for the remainder of the functional organization. This flexibility is affected by the size and complexity of the project, its duration, its geographical location and the contractual constraints and finance.

Figure 2 illustrates the primary forms of organization and how the authority relationships change between them. BS 3375-1 gives further guidance on organization study.

Figure 2 **Authority relationships in organization structures**



4.5.4 Project culture

The management of a project is shaped by a range of factors, including the business sector in which it is based, geographical location, and dispersal of the team and level of project complexity. In determining the context within which the project exists, account should be taken of elements such as political, economic, sociological, technical, legal, environmental and organizational project management capability and maturity.

All of these factors shape the environment that the sponsor, project manager and project team have to deal with, and can assist or restrict the attainment of the objectives, deliverables and benefits of the project. The successful accomplishment of a project generally requires a significant sensitivity to, and understanding of, the context in which it is based.

The top management of both the originating and the project organizations should assume leadership in creating a culture in and around the project that is sensitive to the project context by:

- setting the appropriate policies for managing the project;
- providing the infrastructure and resources to ensure achievement of project objectives;
- providing an organizational structure conducive to meeting project objectives;
- making decisions based on data and factual information;

- empowering and motivating all project personnel to improve the project processes and product;
- providing an environment and role models that support collaborative working processes and behaviours.

NOTE Further information on project culture is given in the APM body of knowledge *[3].*

4.5.5 Capability and maturity

Effective implementation of enterprise-wide project management is frequently hampered by the organizational culture with respect to cross-company accountabilities from top to bottom. Many models exist to assess the capability, maturity or excellence of the management of projects in an organization against a defined set of criteria. Each model is also designed to suggest a road map for improvement. Such models allow an organization to look critically at its processes, practices and outcomes and to make plans to improve those areas that would contribute to their strategy and objectives.

It is important to decide which model would be the best fit for a particular purpose. This is not helped by the language and abbreviations used, with words like maturity, excellence and capability being used in different ways in different models. Whatever words are used, all imply that their use can lead to practical improvement and therefore to increased organizational value.

Any such model needs to be applied with rigour and in a systematic way if measurable improvement is to be achieved over time. Experience and research have shown that when a model is not applied with full commitment from the organization, it is likely to fail.

NOTE Further information on capability and maturity is given in the APM publication Models to improve the management of projects *[4].*

4.6 Legal and regulatory context for projects

4.6.1 General

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;

b) require specific approvals for certain types of activity and outputs.

NOTE Particular attention is drawn to 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;*
- *security and data protection.*

4.6.2 Health, safety and environmental

Any risks to health, safety and the environment should be evaluated in order to ensure such risks are understood and reduced to an acceptable level. Every project should include an audit of these specific risks before work starts. This audit should be updated throughout the life of the project. Audit updates should be scheduled as part of the overall project management plan.

In particular, managers should ensure that appropriate measures are taken to address health, safety and environmental risks, including ensuring that:

- staff are given appropriate training;
- safety management information is provided;
- staff are aware of and trained to use safety related equipment;
- hazards are identified and preventative actions taken;
- risk assessments are conducted;
- all accidents are reported and recorded, and actions taken to reduce the risk of recurrence.

All the above should be covered in the project management plan.

4.7 Project complexity

4.7.1 General

The more complex a project, the greater the inherent risk of not delivering the intended outcomes. Project complexity should therefore be assessed, as part of risk management, by the project sponsor and project manager in order to ensure action is taken to reduce project risk when and where possible. Furthermore, by assessing the complexity of an organization's portfolio of projects, the leadership of that organization is able to achieve its objectives by balancing risks with available resources. The organization's leadership would be aware of the most complex, and therefore risky, projects in its portfolio and would ensure that appropriate assurance and management attention is applied. In addition, the leadership might rebalance the portfolio to reduce the number of risky projects.

4.7.2 Complexity indicators

Indicators are often used to provide a numeric indicator of complexity, which in turn can act to:

a) provide a high level view of the complexity of a project;

b) highlight the aspect(s) of the project which are sources of complexity;

c) point users to differentiated processes or guidelines tailored for use in projects of differing complexity.

A project can have a number of complexity indicators associated with its delivery that need to be taken into account, such as:

1) objectives, assessment and results;

2) criticality to organizational survival;

3) interested parties and integration;

4) cultural, social and political context;
5) geographic dispersion;
6) degree of innovation;
7) project organization and structure and demand for coordination;
8) leadership, teamwork and decision-making approach;
9) resource and skill availability.

These describe the type of complexity associated with a project and the level of complexity, e.g. high/medium/low, so that appropriate management action can be taken. Account should also be taken of any sector-specific complexity indicators that might be critical to the organization's business or market sector.

4.7.3 Complexity and skills

There is a direct correlation between complexity and skills as follows:

a) the perception of complexity is dependent on the knowledge and experience of the individual undertaking the assessment; and
b) the application of appropriate skills, behaviours and competence within a team can reduce the complexity of a project.

Key factors associated with the reduction of complexity include the appropriate application of available skills and competence within an organization, and defining the roles and responsibilities that individuals have to mitigate the complexity area.

4.7.4 Responsibility for assessment and management of complexity

There are significant benefits to be gained in identifying a project's critical levels of complexity and organizational appetite for risk. The project sponsor and project manager should consider complexity within the project's context with a view to improving, or replanning, those areas identified as problematic in order to improve the likelihood of realizing the benefits and reduce project complexity where practicable.

5 Key aspects of project management

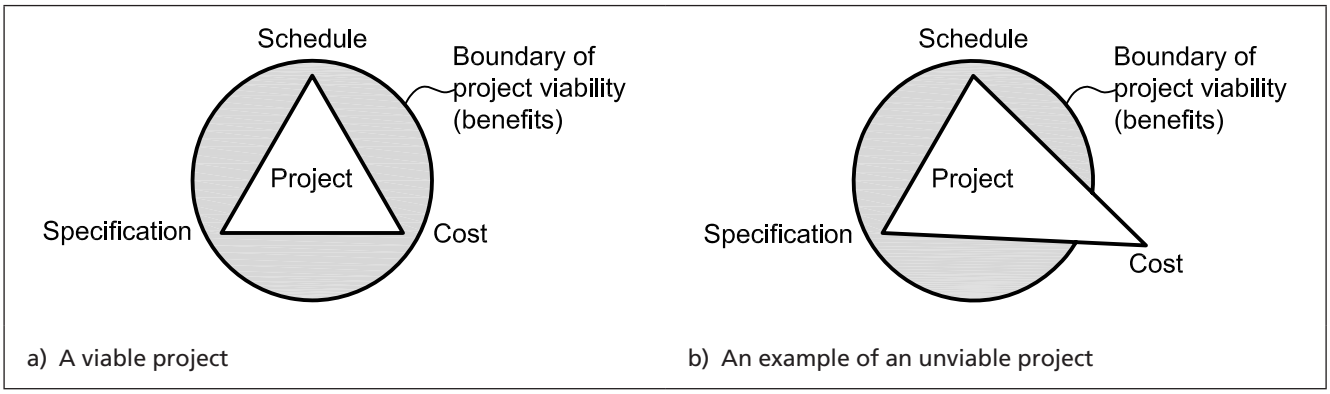
5.1 Principles of project management

5.1.1 Be driven by needs and benefits

All senior managers in an organization should be able to demonstrate explicitly how each project they undertake fits their strategy. The screening out of unwanted projects as soon as possible is key. At the start, there is usually insufficient information of a financial nature to make a decision regarding the viability of the project. However, strategic fit ought to be assessable from the beginning. Organizations which have clear strategies are able to screen more effectively than those which don't. The less clear the strategy, the more likely projects are to pass the initial screening: so there will be more projects competing for scarce resources, resulting in the organization losing focus and jeopardizing its overall performance.

In general, the project team gains more knowledge and is able to reduce project risk as the project progresses. However 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 it if the business objectives are not likely to be met. Figure 3 shows that specification, schedule and cost always have to be bounded to ensure ongoing viability. A problem in any one aspect (e.g. cost, as shown in Figure 3) can lead to it becoming unviable and hence, to termination. In this case, business objectives will not be met and adjustments to the project specification and schedule might be necessary to make it viable. Alternatively the project might have to be terminated.

Figure 3 **Boundary of project viability**



a) A viable project

b) An example of an unviable project

5.1.2 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, in projects adds considerable value in all phases of a project. Usually, the earlier they are involved, the better the result. Many ways have been used to obtain this involvement, including:

a) focus groups;

b) facilitated workshops;

c) early prototyping;

d) simulations.

Involving the stakeholders is a powerful mover for change, while ignoring them can lead to failure. See also **7.2.16**.

5.1.3 Ensure single point accountability throughout the project

Single point accountability should be applied in project organizations. Projects are often too large and complex for a single individual to manage personally. For this reason, projects are decomposed into lifecycle phases and packages of work which are the accountability of a named team manager. These work packages can be further divided into smaller work packages and ultimately into individual activities and tasks, as described in **7.2.2.3**. This decomposition is called a work breakdown structure. In practice, single point accountability

means that every task, activity and work package at any level in the breakdown structure has a single person named as accountable for it. This has four advantages.

a) It is clear what is expected of each person.

b) Overlaps are eliminated as no deliverable can be delivered within two different work packages.

c) If a gap in accountability appears (e.g. due to loss of a team member), the next person up the breakdown structure is accountable to fix it.

d) If scope, cost or time proves to be inadequate to create the deliverables, it is clear who is accountable for raising these issues and who to escalate the issue to.

5.1.4 Practice cross-functional working

Cross-functional working should be exploited to ensure that all necessary work is coordinated and controlled. The need for many projects to draw on people from a range of departments means that a cross-functional team approach is essential. Running projects in functional parts with coordination between them usually slows down progress, produces less satisfactory results, and increases the likelihood of errors. Any organization which uses projects as a management approach should have working practices which encourage lateral cooperation and communication rather than hierarchical. Cross-functional team working, however, is not the only facet; governance and decision making should also be on a cross-functional basis. The more functionally structured an organization, the more difficult it is to implement effective project management. This is because project management, by its nature, crosses functional boundaries.

5.1.5 Allow tailoring of any standard processes and methods

Project management is a self-defining discipline. If an organization uses standard processes or methodologies, these would define how a typical project is undertaken, with the processes covering many of the activities described in Clause **7**. In practice, "typical" is not always enough. Through tailoring, project managers have the opportunity to adapt and tune the standard approach to suit each situation. Tailoring is not, however, a licence for ignoring standards. Tailoring should be undertaken within permitted limits or, if outside those limits, approved by an appropriate manager, in a controlled way. There are different ways of tailoring processes, of which the following are examples.

a) A person uses the standard processes but wants to supplement them without creating an alternative process. Such tailoring should be defined in the organizational or programme standards or in a project management plan. Approval of these normally constitutes approval of the tailoring.

b) A person needs to create an alternative process to replace standard corporate or programme process. Any alternative processes should be managed in order to ensure that they are controlled.

5.2 People and roles in projects

5.2.1 The project organization

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 essential personal attributes. Clause **8** defines the basic skills to look for when selecting appropriate role holders.

Increasingly, projects cut across departmental and organizational boundaries. In these cases, management should ensure that the 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 deliverables. All projects should have people accountable for:

a) governing the project to ensure that managerial and technical oversight is maintained;

b) sponsoring the project in pursuit of stated organizational needs or objectives;

c) managing the project on a day-to-day basis, ensuring that the deliverables are appropriate to the delivery of the desired outcomes;

d) undertaking the specialist work on the project.

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

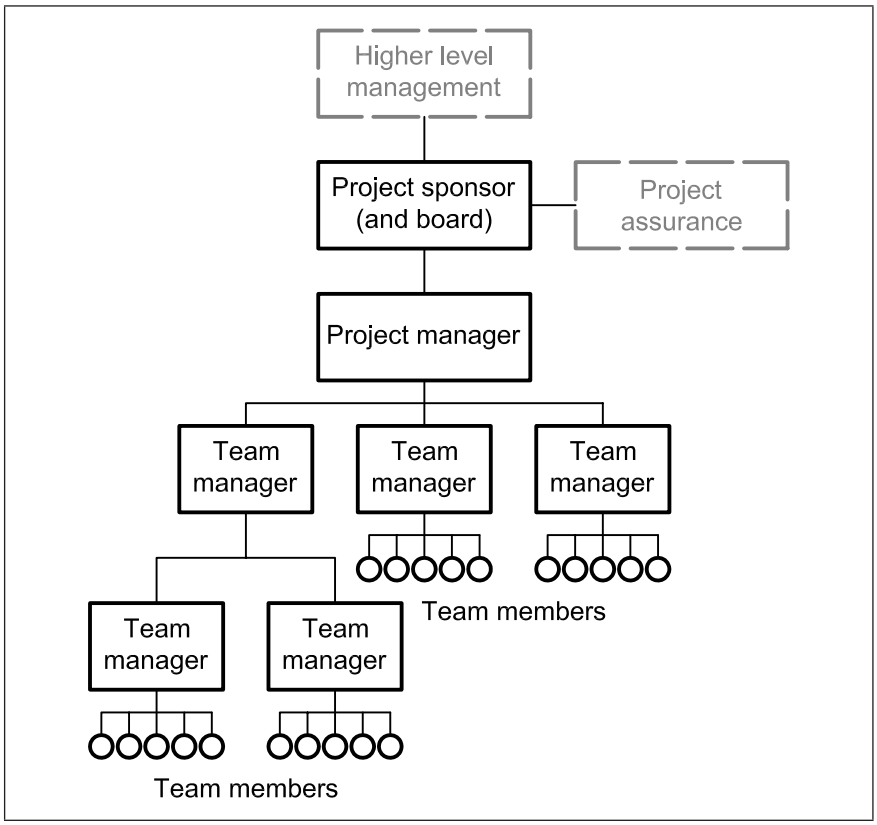
Such roles should be defined in the project management plan. The actual role titles used vary from sector to sector and to suit the organization's own processes, methods, job titles, customs and practices, and can differ significantly from the generic ones given in this guide.

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

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

Figure 4 shows a simplified project organization structure, highlighting the relationships between the various roles described in **5.2.3** to **5.2.8**.

Figure 4 **A simplified project organization structure**



5.2.2 The decision makers – governance

The decision makers should be accountable to higher level management for key decisions relating to the project. Decision makers can be individuals or groups of people (e.g. boards) with the appropriate level of authority, skills and knowledge. The levels of authority and constituency of any decision-making body will normally be defined within the governance arrangements or schemes of delegation of the sponsoring organization. For projects, governance is typically required for:

a) authorizing the start of projects and each phase of a project (see **7.1.3**);

b) authorizing changes to the project (see **7.2.10**);

c) changing the status of a project (see **7.1.3**);

d) ensuring compliance with the organization's policies;

e) ensuring compliance with any applicable legal or regulatory requirements.

In addition, there will usually be a level of oversight of the quality of any outputs, including the application of any organizational constraints, e.g. standards and components to be used.

5.2.3 The project sponsor

The project sponsor should be accountable to higher level management for directing the project to ensure that 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 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 will usually be 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;

d) 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 (see **5.2.2**);

h) approve key project deliverables and project closure;

i) resolve project issues that are outside the control of the project manager;

j) establish and chair 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.

5.2.4 Boards and steering groups

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;

b) provide a forum for assisting with strategic, cross-functional decisions, removing obstacles and for resolving issues.

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

5.2.5 Project assurance

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

- recommending to the project sponsor that reviews or audits should be held;
- checking that user needs and expectations are being met or managed;

- checking that risks are being controlled;
- checking that plans are realistic and achievable;
- checking that the right people are being involved;
- checking that an acceptable solution is being developed;
- checking that the programme/project remains viable and the business need is being addressed;
- checking that the scope of the programme/project is not growing unnoticed;
- checking that any legislative, regulatory or contractual requirements are being met;
- checking that the needs of stakeholders are being respected.

5.2.6 The 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 administrator, or office support team. The project manager should:

a) mobilize the project team, with the agreement of appropriate line managers;

b) motivate and lead the project team;

c) prepare the project management plan and project plans;

d) define the accountabilities, work scope, and targets for each team within the project;

e) sanction the start of specific work items;

f) monitor and manage project progress;

g) monitor and manage risk and opportunities;

h) manage the resolution of project issues;

i) manage the scope of the project and control changes;

j) forecast likely benefits;

k) deliver the project deliverables on time, to budget, at agreed quality;

l) engage stakeholders;

m) manage the closure of the project.

5.2.7 The 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 deliverables as are delegated 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;

i) be accountable for directing and supervising the individual members of the team.

5.2.8 The team members

Team members should be accountable to the respective team manager for such deliverables as are allocated to them, ensuring that they are completed on time, to cost, quality and to budget.

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

5.3 Project lifecycle

Most projects, irrespective of size and complexity, will naturally move through a series of distinct phases from conception to completion. This applies as much for sequential development (e.g. analyse, design, build, test) as for iterative and agile development (see Annex A).

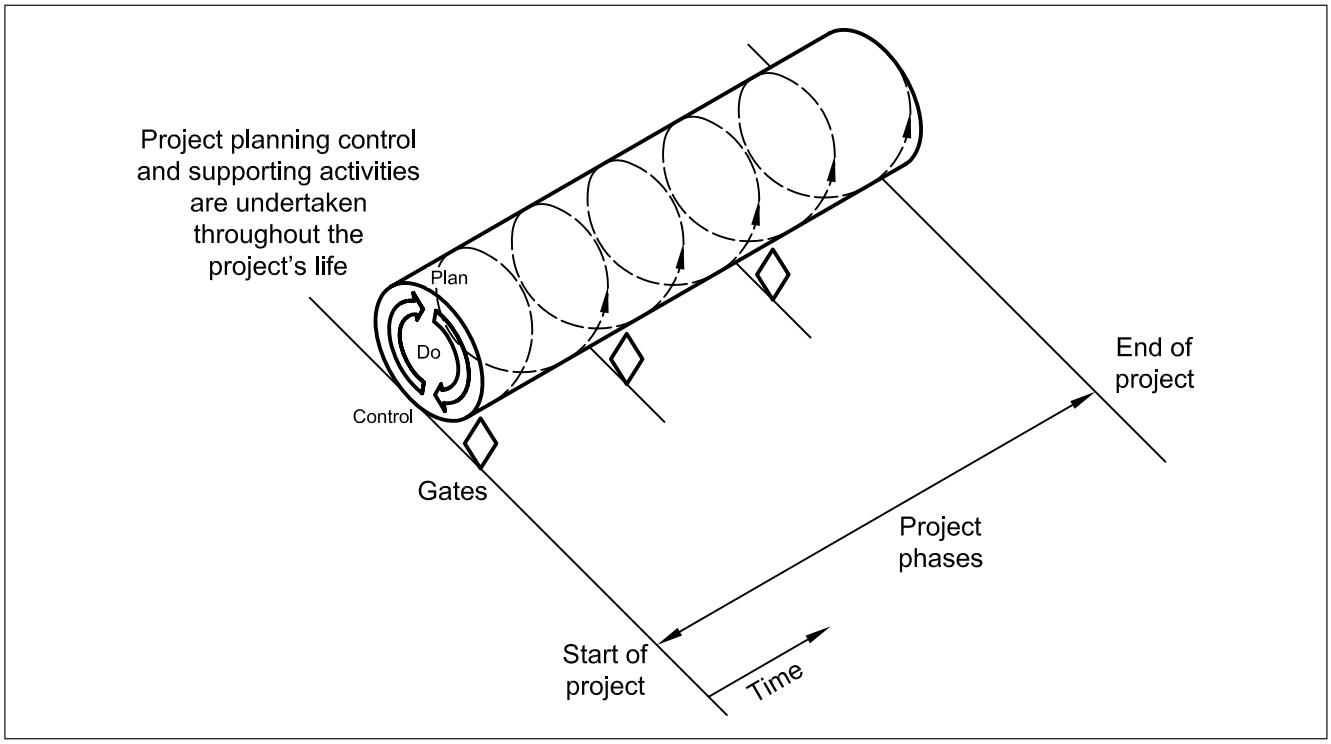
Phases should be formally identified and separated to enable effective management of the project, where commitment of resources and ongoing authorization is required. Generally, the early phases comprise investigative work, which determines the work in the later implementation phases.

The project lifecycle is a key tool for managing risk on projects. By dividing a project into discrete phases, each with its own characteristics and requiring an explicit "go"/"no go" decision before starting, a promoting organization can limit the release of funds (a phase at a time) and verify ongoing viability before moving on. Contracting 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. Organizations and sectors of industry tend to develop specific project lifecycles that are applicable to the industry or type of output being created.

Figure 5 shows the main components of a lifecycle and their relationship to the project control activities, described in Clause **7**. Project lifecycles are considered in more detail in Clause **6**.

NOTE "Stage" is a commonly used alternative to "phase". In this 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 assume to be a sub-part of a phase or vice versa.

Figure 5 **Project lifecycle showing phases, gates and the continuous application of project planning, control and support activities**



5.4 Project management activities

5.4.1 Context for management activities

The output of a project is created by carrying out work to produce deliverables which will enable the desired outcomes and benefits to be realized. This requires three sets of activities:

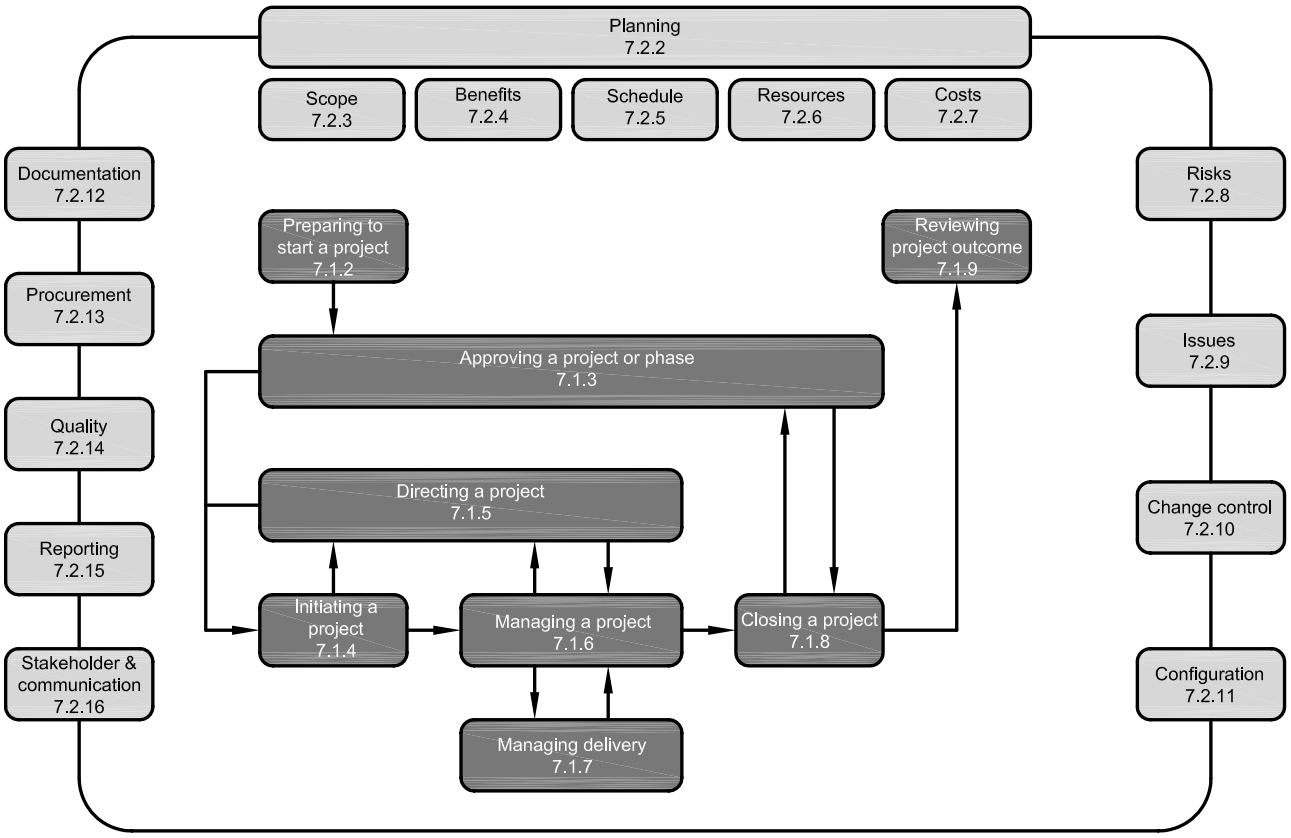
a) those used to plan and control the project and ensure the integration of its constituent parts, ensuring that scope, time, costs and quality needs are met and the objectives achieved (see **7.1**);

b) those used to support the project team, to ensure the consistent and predictable application of techniques which have been shown to be effective in managing projects, e.g. those used for managing risk, planning and controlling change (see **7.2**);

c) those used to define and deliver the project's specialist products or outputs, often defined in other standards. Such activities vary by application area and are used by the specialist team members. Examples include various construction techniques, software development, system engineering, product development, pharmaceuticals/drug development, military operations, public policy development. These are outside the scope of this standard.

The project integration and support activities are shown in Figure 6.

Figure 6 **Project integration and support activities**



Such activities are often defined in an organization as a set of processes, procedures or methods, which prescribe what needs to be done and how. In essence, a project comprises tasks to create deliverables.
A process comprises a series of steps, with an input and an output, which are used to ensure that the project tasks are undertaken in a consistent way and are highly likely to produce required deliverables. Therefore, whilst tasks are planned and undertaken in a finite time period, the activities (defined in processes) are often used in an iterative way within the project's tasks or across a number of tasks.

Processes and activities are not stand-alone, and the outputs of one are often the input of another, therefore a chain reaction is often created from a single incident or trigger. For example, a project might have been well initiated and planned and appears to be proceeding well, but a risk is identified which is unacceptably high. This might lead to an alternative approach being taken to reduce the risk. The project's solution and approach might need to be revised, leading to rework for planning and the specialist product work itself to define the new solution. This can have an impact on the entire timescale and cost for the project, leading to formal control of changes including checking its viability. Therefore, any number of supporting activities

might need to be used as part of that task, in an integrated way. The integration is effected through the control activities which oversee both the project management tasks and the delivery tasks.

5.4.2 Project integration activities

The project manager should ensure that the project is under management control from start to end. This requires effective reporting, escalations, direction and information flow up and down the project hierarchy and determining how major approvals are handled. The project integration activities are described in detail in **7.1** and listed below:

a) preparing to start a project;

b) approving a project and phases within a project;

c) initiating a project;

d) directing a project;

e) managing a project;

f) managing delivery (of specific work items);

g) closing a project;

h) reviewing project outcome.

These are supplemented by supporting activities, which describe how specific project management tasks are undertaken.

5.4.3 Project support activities

The support activities which are most commonly needed on projects are described in detail in **7.2** and listed below. Organizations may add to this to meet their own needs:

a) managing planning;

b) managing scope;

c) managing benefits;

d) managing schedule;

e) managing resources;

f) managing costs;

g) managing risk;

h) managing issues;

i) controlling change;

j) managing configuration;

k) managing documentation;

l) managing procurement;

m) managing quality;

n) managing reporting;

o) managing stakeholders and communications.

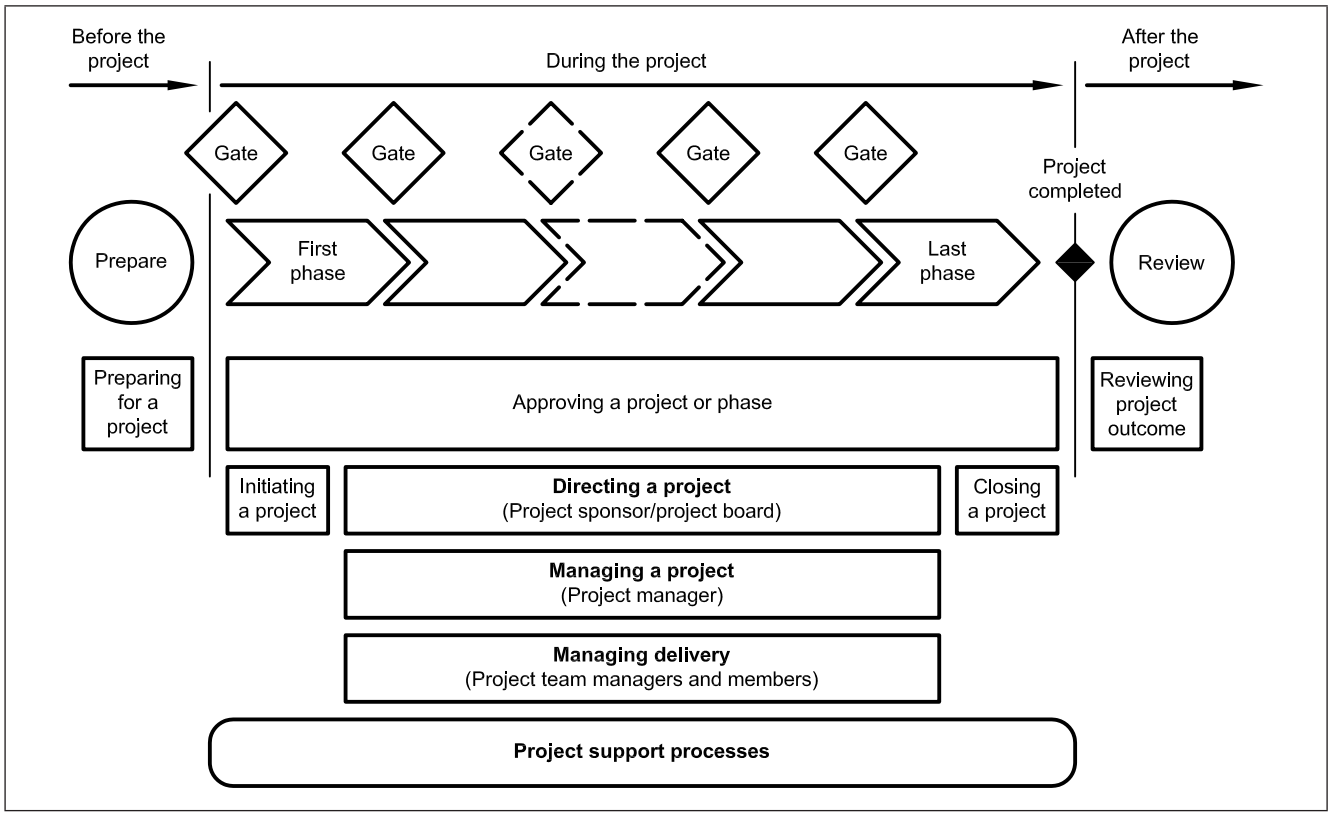
These are often used in an integrated approach, which is controlled through the project management activities.

6 The project lifecycle

6.1 A phased approach to projects

A project lifecycle is a collection of generally sequential, time-based, project phases whose name and number are determined by the control needs of the organization(s) involved in the project. Generally project lifecycles comprise two to six phases – seldom more than ten. The project lifecycle should link the start of a project to its end. While every project has a definite start and a definite end, the activities required and deliverables produced vary widely from project to project. For this reason, lifecycles also vary to meet the needs of the organization and reflect the work content of the project. A lifecycle can be determined on a project-by-project basis or documented in a methodology. A methodology provides a consistent lifecycle for projects which are either similar in objective or provide consistent direction, management and control within an organization. For all methodologies, tailoring should be allowed (within defined limits) in order to meet the specific needs of an individual project. Figure 7 shows a project lifecycle in relation to the management activities, which are described in Clause **7**. Start-up workshops for each phase provide a productive forum for diverse stakeholders to build collaborative relationships, clarify and align objectives and establish a common understanding of the challenges that lie ahead. For large and complex projects, independent facilitation might be useful.

Figure 7 **Project lifecycle, showing relationship to project management activities**



6.2 The components of a project lifecycle

6.2.1 General

All project lifecycles should have the following elements, which should be specifically identifiable in the project plan:

a) gates – the decision point prior to starting each phase;

b) phases – the period of time during which work is undertaken;

c) milestones – delimiting the end of a phase or other significant achievements or control points.

6.2.2 Gates

A gate is the decision point which should be used to:

a) check that the project is still required by the sponsoring organization and is viable in all respects (technical, operational, commercial etc.). If not, the project should be considered for termination;

b) confirm that the risks are acceptable, bearing in mind risks which are both internal to the project and external to, but impacting, the project's business objectives;

c) confirm the project's priority relative to other projects (if any);

d) approve the plan for the remainder of the project;

e) confirm that there are adequate resources to complete the project;

f) make a "go", "no go" or deferral decision to continue the project.

The decision may be to:

1) start the next phase of the project;

2) defer the start of the phase while more information is collected or rework undertaken;

3) trigger the termination of the project.

The project manager should not normally be the decision maker for the primary gates, but rather the information provider. The lowest level decision maker should be the project sponsor, as this is the role accountable for ensuring that the project outcomes will realize the required benefits, and is the primary risk taker. Many organizations, in the public and private sectors, have specific higher level boards which are accountable for the decision and which might oversee a number of projects. This is to ensure that the complete portfolio of projects under their direction is balanced in terms of delivery, objectives and risk. Criteria are often defined and used to aid decision makers, which can be tailored specifically for each decision point through the project lifecycle.

If a project phase is of long duration, it is recommended that it is divided further, with appropriate gating, which might require a lower level of decision-making authority, An example would be the construction phase of a civil engineering project. In such situations, the lower level gating may be delegated.

It is good practice to:

i) define the criteria for a "go" decision at each gate;

ii) define who needs to be involved in any review, prior to a gate decision;

iii) define who is accountable for the decision at each gate;

iv) undertake assurance in order to better inform decision making.

NOTE Gates are commonly called decision points, check points and gateways.

6.2.3 Phases

A phase is the period of time during which actual work on the project takes place. The characteristics of a phase are as follows.

a) The first phase normally comprises work to mobilize the project team, planning the project and confirming viability, through establishing a business case as defined in **7.1.4.4**.

b) Phases are generally sequential in time and involve some form of transfer or handover of deliverables to the next phase. They may further subdivided. Phases may overlap if the risks are acceptable to the decision maker at the decision point.

c) Risk should decrease through the project lifecycle. Generally any work within a phase should reduce the risk; if it does not, it should be undertaken in a later phase, provided time constraints can be met. This reduces the cash flow for the project.

d) The work should have a distinct focus that differs from any other phase. This often involves different organizations and different skill sets or risk profiles. In agile projects, a phase can include a complete agile cycle.

e) Phases should include work from all functions (operational, technical, commercial etc.), to ensure that the outputs from the project will realize the outcomes and benefits needed.

f) Plans for the next phase should be developed towards the end of the previous phase. The plan should be in detail for at least the next phase and in outline for the remainder of the project.

g) The final phase normally comprises overseeing any new operations, pending full hand-over to the ongoing teams, demobilizing the project team and its facilities and closing the project as described in **7.1.8**.

NOTE "Stage" is a commonly used alternative to "phase".

6.2.4 Milestones

The milestone at the end of a phase should be used to verify that the work scope defined for the phase has been completed. In particular:

a) ensure that any outstanding activities or deliverables have been assigned. These should be very few and may be carried over into the scope of the next phase. It is not beneficial to keep a project phase open for a long period simply to cover a few low-risk items;

b) acknowledge team performance and contribution during the phase;

c) consolidate any lessons learned for the benefit of later phases or projects.

Other milestones should depict key events in the project which need to be tracked and which are often provided in summary reports to senior management and stakeholders. This can include:

1) the approval of key deliverables;
2) the successful completion of key activities (e.g. testing);
3) points of contractual significance;
4) the start of key activities.

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

6.3 The extended project lifecycle

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 traditional project lifecycle, shown in Figures 5 and 7, is extended to cover the full operation of the service (sometimes called a product lifecycle) as shown in Figure 8. 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.

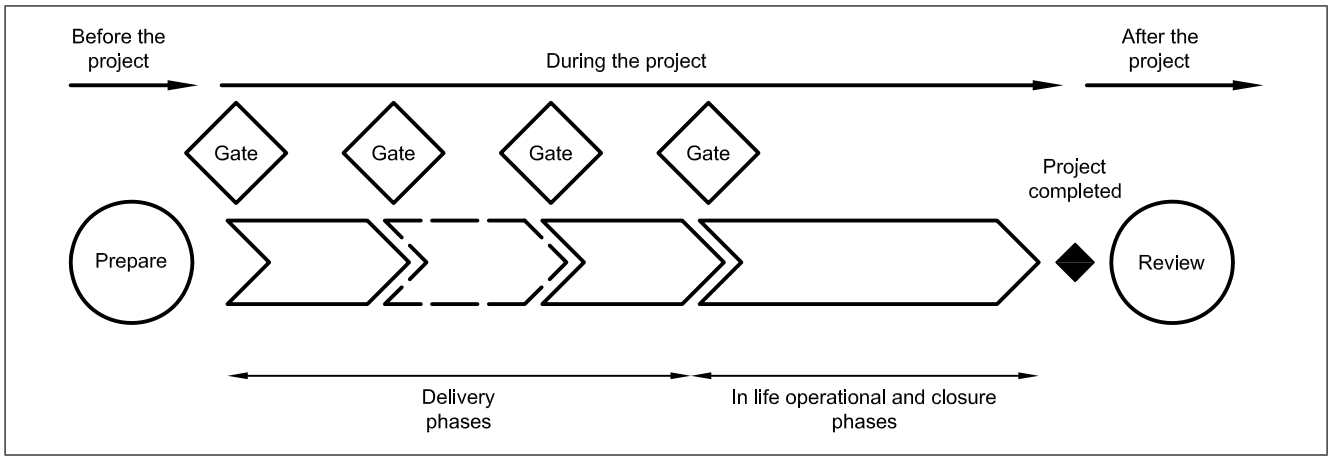
    2) Retirement or withdrawal phases: the capability is withdrawn, retired or decommissioned when it is no longer needed. This is often complex and also requires a project approach.

The above is often better managed as a programme.

6.4 Interactions between project lifecycles

In larger and more complex projects, projects are often embedded within projects. This is very apparent when there is a promoter–contractor relationship (see **4.5.2**). The relationship between the promoter of a project and any contractors should be fully understood. This can become complex, as in many cases, the promoter's project is supported by a number of contractors, each of whom see their part of the promoter's project as their project in its own right. This is understandable as each party is a separate entity and has to look after its own business interests.

Figure 8 **Extended project lifecycle, including in-life activities**



The promoter of a project will be looking for the benefits their organization will reap from the outcomes that will result from the project. The contractors will be looking to make a return on the work that they undertake. Matters can be made even more complex as the contractors often have numbers of subcontractors who also see their part of the project as their project. This has significant implications on decision making.

Business decisions are made in light of the business context of the organization which owns the project. An organization should not normally interfere in the governance of another organization except through the medium of an agreed contract. It is therefore entirely acceptable that the different parties in such a complex relationship might be working to different project lifecycle models as each needs to address its own interests. In contracts, the relationship between contractors and clients is often aided by certification.

In certification, the customer requires certain work undertaken by a contractor, assesses the quality of the work and, if acceptable, grants a certificate, which often leads to payment. Such certificates are usually backward looking, as they require evidence that contracted work has been undertaken to the desired quality. Again, just like quality reviews, to which they are often aligned, certification points should not be confused with gates. But unlike quality reviews, they always have contractual significance. Even within a single organization it can be effective to divide a project into a number of sub-projects, each of which may have its own lifecycle, and which are cross-coordinated through dependency management. Such situations are tending towards becoming programmes.

The more complex a project, the greater the inherent risk of not delivering the intended outcomes. The complexity of the project therefore needs to be carefully and regularly assessed by the sponsor and project manager in order to ensure that action is taken to reduce project complexity when and where possible. This improves the internal and external opportunities of a project in organizational project management terms. 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 risk appetite, 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 can also form part of the assessment process for the "go", "no go" or deferral decisions.

To do this, sets of complexity indicators (see **4.7.2**) need to be agreed by the organization/sponsor and project manager in order to establish a baseline and to act as a live practical tool for discussion on project issues and progress. By doing so, the sponsor and project manager will regularly be able to discuss the areas of concern which affect the project's delivery and clearly define mitigating actions where possible.

6.5 Relationship between project lifecycle and management activities

The project lifecycle should not be confused with the project control and support activities. The control and support activities are usually undertaken in an iterative manner, at any time during the project, either in a predetermined way (such as relating to phases) or ad hoc, in response to an issue or risk. Similarly, monitoring and controlling activities are undertaken in a cyclic way, often called the control cycle, with the frequency of reporting and intervention determined by the nature and speed of the project and the size of the element being managed. The relationship between the project control activities and the lifecycle is shown in Figure 7.

7 Managing the project

7.1 Project integration activities

7.1.1 Activity flow

The management activities shown in Figure 9 are related to the roles undertaking them (see **5.2**):

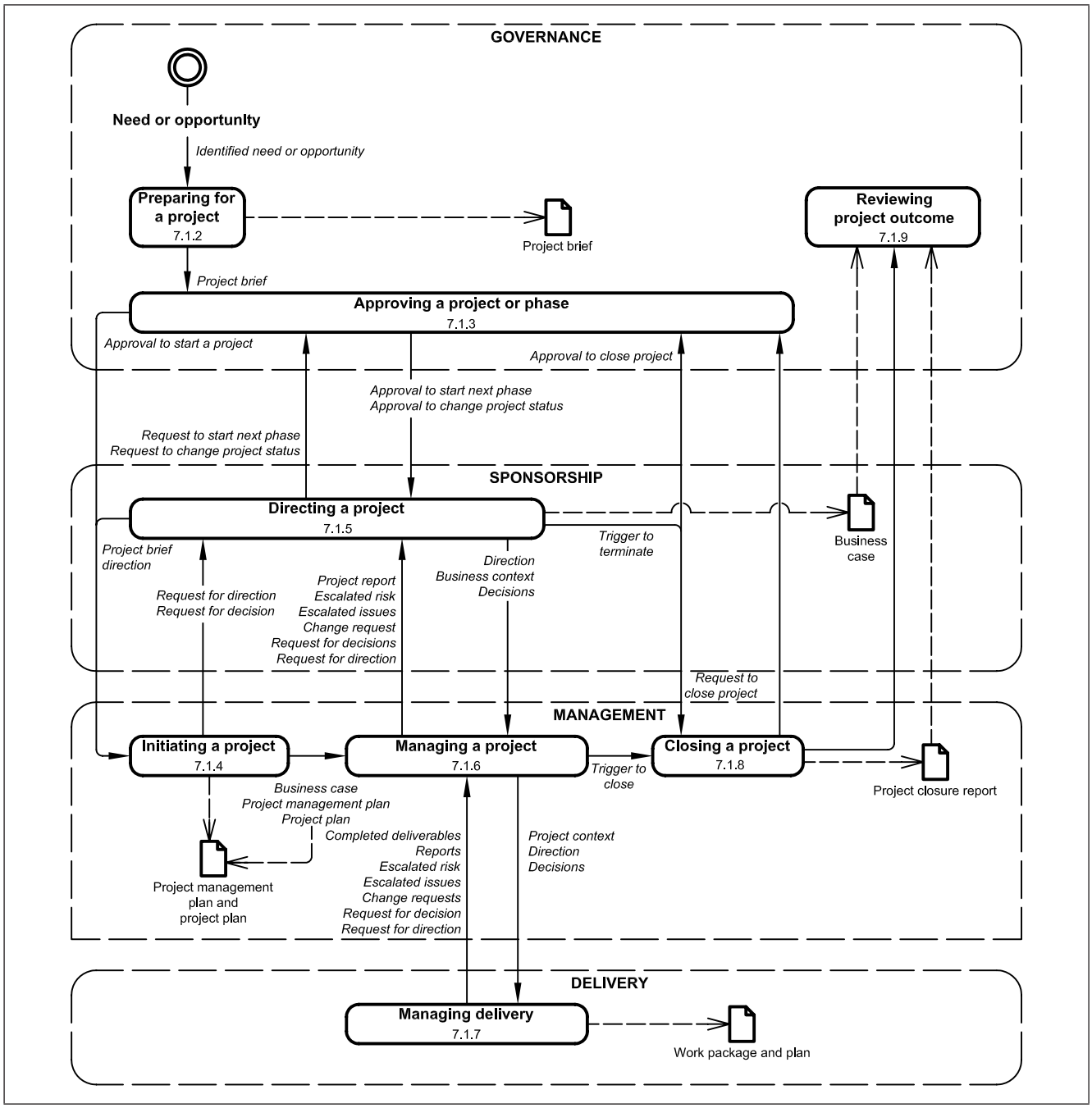
a) governance related to identifying projects, approving them and assessing outcomes;

b) sponsorship through the project sponsor or delegate directing the project;

c) management through the project manager initiating, managing and closing the project;

d) delivery through team managers, supported by their teams, creating the project's outputs.

Figure 9 **The principal activity flows for project integration activities**



7.1.2 Preparing for a project

In order to have a controlled start to a project, preparatory work should be carried out prior to the formal start of the project to prepare a project brief. This activity can take a number of forms.

a) For internal projects, it is part of ongoing corporate management as part of project portfolio management.

b) For programmes, the projects are identified as part of project portfolio management.

c) For contracting organizations, the project would start with the invitation to bid or tender.

In all cases, the sponsoring group in the organization should identify a senior manager (project sponsor) who will be accountable for the realization of the benefits which will derive from the project, and who will establish the project objectives. The result of this work should be a statement of the business objectives, expected outcomes and outline case for the project. 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 **7.1.3**).

NOTE A project brief is a sometimes called the terms of reference, concept or proposal.

7.1.3 Approving a project or phase within a project

7.1.3.1 General

Approving a project should comprise two aspects:

a) approving the start of a project, new phase of a project and closure;

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 and project plan.

3) Closure happens as a result of the project being terminated (see **7.1.3.5**) 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. Projects are suspended to enable "thinking time" 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 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):

i) proposed: the project has not started;

ii) in progress: the project has been approved and work is being undertaken;

iii) on hold/suspended: significant work has been halted while an issue is investigated;

iv) terminated: the project has been closed early as a result of a major issue;

v) completed: the project scope has been completed.

Formal approval should be undertaken to ensure that funds and resources can be made available and committed to the project. Approval usually has three steps: evaluation and application followed by formal approval. 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, at which point further authorization will usually be dependent upon satisfactory progress and verification that the objectives will be achieved. In most organizations there will be several levels of approval, each management level having authority to approve capital expenditure to a preset 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). The splitting of a large project into smaller projects, so that approval can be given by a lower level of management, should not be condoned; this practice is ultimately counter-productive.

No substantial work, commitment of resources or expenditure should be permitted without prior approval. Small projects may be approved by a senior manager, but major projects should be submitted to the top management level for authorization. Applications should be presented in writing, in a standard form, for signature by the decision makers (see **5.2.2**).

7.1.3.2 Preparing for approval

The documentation required to support approval to start the next phase of a project varies considerably but would normally contain 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) the human and physical resources needed;

e) a realistic assessment of the business, cost, schedule and technical risks involved;

f) a forecast of the effect of the project upon the operation and strategic plans of the sponsoring organization;

g) a recommended project plan.

7.1.3.3 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 new phases, within the constraints of any higher level delegations or authority. Applications for major projects should be comprehensive and realistic; they should be presented in writing, in a standard form, for approval by the decision makers (see **5.2.2**).

7.1.3.4 Formally approving a project or phase of a project

Organizational policies or procedures might define who the decision makers are for a project, 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 management plan.

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

The approving authority should decide whether or not the project should proceed, given the funding required and competing demands for finance, human and physical resources. The 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.

7.1.3.5 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;

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 suspending or terminating a project. Only when such a review is completed, should direction be given by the project sponsor to the project manager. This may comprise:

1) continuing the project;

2) suspending the project, whilst further investigations are undertaken. Direction should be given as to what work should continue during this period and what should be delayed;

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:

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

ii) terminate the project.

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

7.1.4 Initiating a project

7.1.4.1 Establishing the project organization

The project sponsor should establish the accountability and authority of the project manager. The project manager should determine the roles and accountabilities of the suppliers and the project team and, if necessary, provide written terms of reference for each. Organizational factors which should be defined include the following.

a) **Limits of authority**: the project sponsor, manager and team managers should understand the limits of authority for any action that they take.

b) **Communication framework**: the project manager should put in place an effective communication network to ensure that all stakeholders, engaged on project progress, can express concerns and discuss how to achieve the project objectives.

c) **Incentive mechanisms**: internally these might be represented in bonus and reward schemes. Externally, they might be represented as contractual incentives relating to the provision of goods and services.

7.1.4.2 Developing the project management plan

The project management plan should define how a project is to be undertaken. There might be variation in content, style and volume, due to variety in the work and in the circumstances in which a project is to be undertaken. The project management plan should comprise:

a) project name, reference code, issue number and date of issue;

b) contents;

c) name of sponsor;

d) reference to policies, standards, specifications, health, safety and environmental issues:

   1) project security and privacy;

   2) project policy;

   3) project approvals and authorization limits and names of those individuals or bodies holding authority;

e) project organization including the core project team members:

   1) team organization;

   2) project staff directory;

   3) terms of reference for project manager and staff;

   4) directory of interested parties;

   5) list of associated supplier contracts;

f) description of the project lifecycle being used for the project, together with gating and predetermined review points;

g) reference to organizational processes, procedures and guidelines to be used, stating how project activities should be undertaken, e.g.:

   1) planning;

   2) scope management;

   3) benefits management;

4) schedule management;
5) resources management;
6) cost management;
7) risk management;
8) issues management;
9) change control;
10) configuration management;
11) documentation management;
12) procurement management;
13) quality management;
14) reporting;
15) stakeholders and communications management;
16) project assurance;
17) contract management;
18) integrated logistic support (ILS) management;
19) technical management;
20) environmental issues;
21) health and safety management;
22) legal requirements;
23) document distribution schedule;

h) document circulation and contacts list;

i) glossary of terms used.

NOTE The information in the project management plan, project plan and business case may 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.

7.1.4.3 Developing the project plan

The project manager should coordinate 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 objectives and the means planned to achieve them;

b) summary of the project completion criteria and how the sponsor decides whether or not the project has succeeded in achieving its objectives;

c) commitment acceptance;

d) scope;

e) project breakdown structure(s) to be used (e.g. work, cost, product, organizational, risk);

f) schedule;

g) resources;

h) cost;

i) benefits;

j) planning assumptions;

k) planning constraints;

l) risks.

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

NOTE *See Note to* ***7.1.4.2****.*

7.1.4.4 Developing the business case

The project sponsor (or delegate) should prepare a business case, which sets out the business objectives for the project and a justification for undertaking it. It should comprise:

a) reference to the organizational strategy or plan to which the project contributes;

b) reference to the feasibility report (if any) on which the original decision to authorize the project was based;

c) business objectives for the project;

d) criteria by which project success is to be measured in financial and non-financial terms;

e) justification for undertaking the project, which might comprise:

   1) cost-benefit analysis;

   2) net present value and internal rate of return calculations;

   3) sensitivity analysis;

   4) scenario analysis.

The justification should include a forecast of the financial impact of the project in terms of its probable costs and benefits. Because, with few exceptions, the organization will incur significant costs long before the benefits of the project are realized, tight cost controls should be exercised throughout. 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.

The analysis should assess whole life costs taking account of, for example, major cost implications, such as those in a manufacturing environment where the build-up and financing of tooling, raw materials, manufacturing stock and marketing efforts will consume cash well before any income is received. With certain types of project, such as those in the power industry, the appraisal should allow for decommissioning and/or disposal costs that will arise after operations cease. In other words, the financial case should encompass all aspects of the project lifecycle. It is not enough just to know the respective totals of income and expenditure.

The financial and cash flow information should generally reflect the timing of the various operations and may be presented as a plan or network; information regarding the timing of the expected cash outflows and inflows is essential. The intervals used in the financial

plans and assessment will reflect the size and complexity of the project, ranging from perhaps monthly on small schemes, to yearly for the very long-term projects.

In undertaking an analysis, it is essential that the sensitivity of the project to the various risks is taken into account so that the authorizing body has a clear idea of the range of results that could be expected. For complex projects, a risk management plan is essential and should be maintained throughout the duration of the project. There is, for example, a particular need for risk analysis in those projects where there is a high research element and a significant chance of failure, such as the development of pharmaceuticals.

*NOTE See Note to **7.1.4.2**.*

7.1.4.5 Defining the project's terminology

During the start-up of the project, the project manager should define the terminology which is to be used on the project. This may be specific for the project or be derived from organizational methods and processes. Consistency in the use of terms is essential if communication is to be precise. It is frequently found that different organizations use similar terms in entirely different ways and with different meanings.

7.1.4.6 Defining security needs

The project manager should be responsible for the security of the project assets. This will require control of the distribution of certain documentation. Each holder of any project documentation plan should understand and comply with the rules of disclosure governing the document. The rules might be dictated by commercial sensitivity, data security, national security or professional confidentiality requirements. Where appropriate, documents should be clearly marked to indicate their security level, e.g. "personal and confidential", "restricted", "Secret" etc.

7.1.5 Directing a project

The project sponsor should:

a) understand the context within which the project is undertaken and its outputs operated;

b) identify and engage key senior level stakeholders;

c) receive and communicate any decisions and direction to the project manager and key stakeholders, as appropriate;

d) request advice and guidance from higher management, including escalating risks and issues which cannot be resolved at project level;

e) receive information and reports from the project manager and key stakeholders and provide advice and direction as required;

f) approve key project documents prior to gate authorization and confirm phase completion as defined in the project management plan.

*NOTE See **5.2.3** for the project sponsor's role with respect to directing a project.*

7.1.6 Managing a project

7.1.6.1 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 **5.2.6** for the project manager's role with respect to managing a project.*

7.1.6.2 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 of the start of the phase;

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 engagement plan;

f) clarify any administrative needs, including costs.

7.1.6.3 Monitoring and controlling the project

The project manager should monitor the progress of the project against the project plan, including the handover of completed deliverables from the project team and to the ultimate owners, and initiate any corrective action to address variances or escalate as appropriate.

The monitoring and analysis of project data should enable the project manager to address problems at an early stage 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 problems after they have assumed unmanageable proportions.

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 will help the project manager and team managers to understand the status of the whole project, the effect of their performance on the project objectives and any risks that lie ahead.

The team manager is accountable to the project manager for the completion of committed tasks to time, cost and specification, and should warn the project manager of any operational issues that affect the work of other team managers. The team manager should ensure that scope data are kept up to date, inform the project manager of tasks in danger of becoming critical, and provide a revised risk assessment for the task. Similarly, the project manager is responsible for keeping team managers briefed on the current state of the whole project. Specific project

monitoring reports might be required, and the vital basic elements of information that all projects require are as follows.

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. This will either ease or increase the financial burden of the project.

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 also 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) **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 process that provides strong 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.

The use of EVM will indicate where deviations to the baseline 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.

7.1.6.4 Managing risks

Once a project's objectives have been confirmed and clarified, so that what is at risk is understood, the project manager should ensure the continuation, throughout the project's lifecycle, of the risk assessment activity begun in the project conception phase. Risk assessments should be continually updated and the project plans modified as necessary. The uncertainty accompanying all projects should be accepted and risks should be managed in a positive way, whether a risk poses a threat or gives rise to an opportunity.

As a result of monitoring and analysing risks, the project manager is expected to be able to identify those tasks where an alternative course of action is needed to mitigate the risk. Using the project plan, the project manager can experiment with various alternative risk avoidance tactics and should select those actions that best contain or avoid the risk. The project manager might need to obtain the support of the project sponsor to follow two parallel courses of action in order to manage an otherwise unavoidable risk.

The project manager should gain the support of team managers when deciding a new course of action. This negotiation is likely to follow the steps for planning until agreement is reached, when a revised project plan might be issued.

The risk of success or failure should be assessed continuously by means of cost and time estimates of the interdependent network of tasks that make up the project. The overall project risk can be analysed by simulating project progress, in a series of tests, using random sampling from the best and worst most likely time and cost distributions for each task and calculating where the critical path most often lies. This will produce cumulative cost and time distributions around the planned project cost and finish date. It can also produce a list of all project tasks, ranked in order of the likelihood that each task will be on the critical path. Thus a task with a 95% chance of being critical should warrant more attention than a task with only a 5% chance of being critical.

*NOTE See also **7.2.8**.*

7.1.6.5 Reporting progress

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

The team manager should fulfil the regular reporting requirements contained in the project management plan, and should report to the project manager if the progress of work deviates significantly from what was originally planned. Such exception reports should not only explain the reasons for exceeding or failing to achieve performance thresholds, but also describe how the situation can be recovered.

*NOTE See also **7.2.15.***

7.1.6.6 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 structured nature of the tasks contained in the plan is expected to enable the project manager to control the project by releasing or stopping work, by any permutation of tasks or parts of tasks. Critical project reviews might be required at specified milestones throughout long lead time projects, in order to give the project sponsor and project manager the opportunity to review progress and decide whether to continue or curtail work. 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 requested and the individual for whom the money is intended.

7.1.6.7 Preparing for starting a new project phase

As soon as progress against the 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;

f) initiate the request for approval to start the next project phase.

7.1.7 Managing delivery

As soon as approval to start a work package has been received, the team manager should:

a) plan the detailed work for the work package, engaging the team members as appropriate, taking into account any required standards and the project context and risk;

b) request and receive approval from the project manager for the work package definition and plan, undertaking any rework as directed.

On 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;

2) managing any procurement and suppliers;

3) monitoring and forecasting effort, costs, resources and schedule;

4) identifying and engaging stakeholders;

5) reporting to the project manager and stakeholders;

6) managing and escalating risks and issues as appropriate;

7) identifying and raising change requests;

8) maintaining configuration control of the documentation and deliverables;

9) handing over completed deliverables;

10) obtaining confirmation of work package completion from the project manager.

7.1.8 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:

a) review the efficiency of the project in terms of meeting the original time, cost, and scope;

b) confirm that the outputs of the project have been handed over, where appropriate, to ongoing management;

c) confirm that the anticipated benefits have been built into the organization's forecast performance;

d) 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 will need to take action to address the unresolved need which initiated the project in the first place.

There are three key steps to closing a project:

1) prepare the closure report;

2) formally close the project;

3) administratively close the project.

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

i) finalize the project closure report;

ii) prepare a communication, enclosing the approved project closure report to the stakeholders, confirming the decision to close the project;

iii) complete any outstanding closure actions;

iv) feed back any suggested process improvements to the relevant project offices and/or process support group.

7.1.9 Reviewing project outcome

When sufficient time has elapsed for the benefits to be evident and meaningfully measured, the project sponsor should coordinate 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 operational performance and practice match those predicted in the business case;

c) what corrective action, if any, is required to ensure that the outcome meets that defined in the business case.

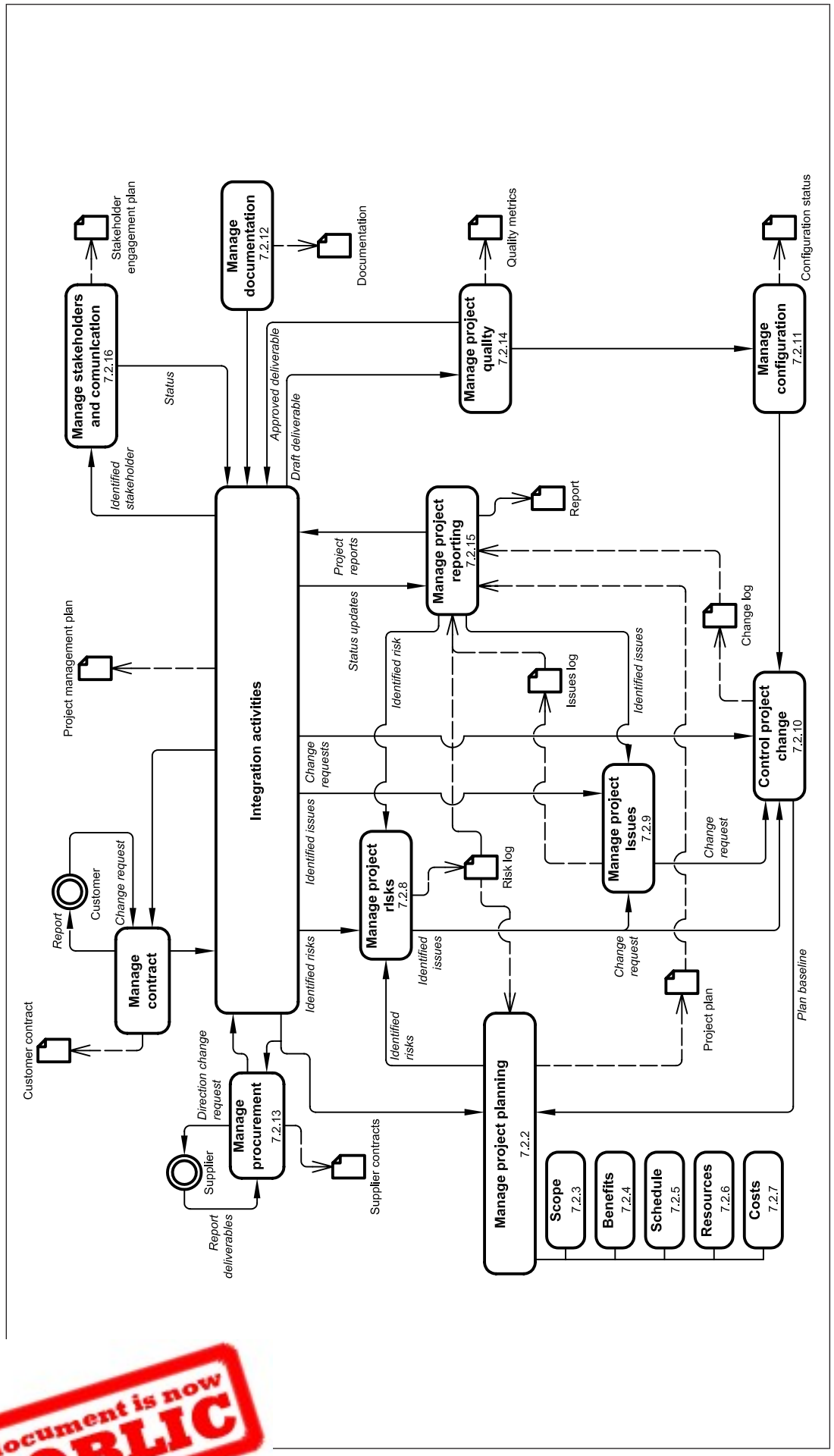
This review might happen towards the end of a project, after the project has been closed. In addition, a number of reviews may be planned.

7.2 Project support activities

7.2.1 Activity flow

All project support activities, shown in Figure 10, might be used by any member of the project team and be applied to any part of the project for which they are accountable. For example, a project manager could apply these to the whole project or a phase of the project, whilst team managers could apply them to the work package for which they are accountable.

The principal activity flows for supporting a project



7.2.2 Managing planning

7.2.2.1 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 will 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 plan should be regularly reviewed and updated, as necessary, throughout the project lifecycle. 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 will 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;

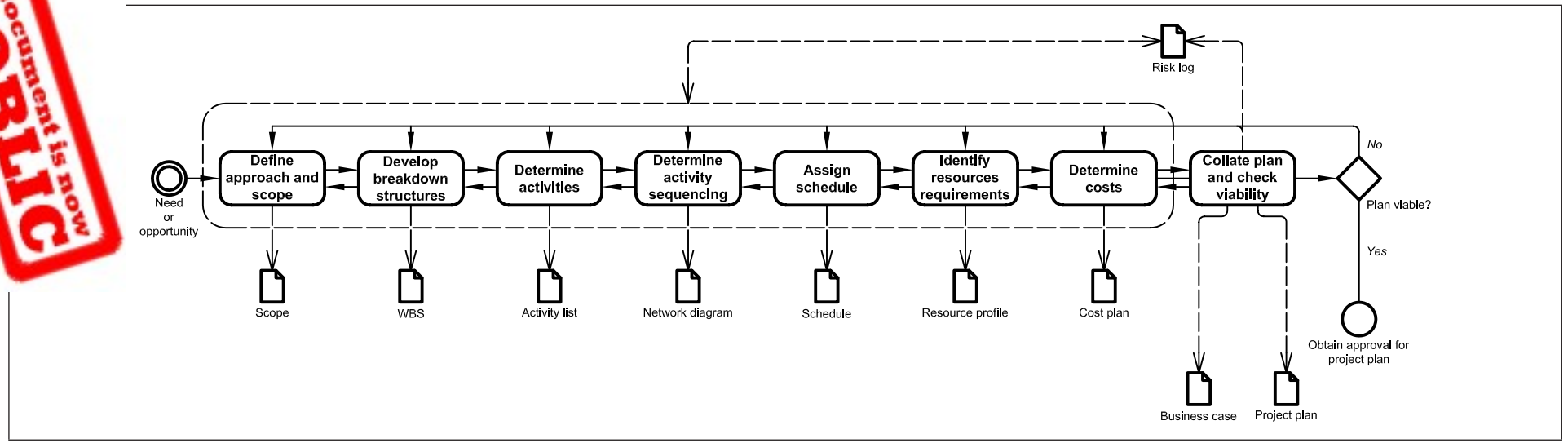
g) determining the costs;

h) checking the viability of the plan with respect to any constraints, the business objectives and residual risk;

i) monitoring ongoing viability.

These are described further in **7.2.2.2** to **7.2.2.10**. Figure 11 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 will enable the realization of the expected benefits.

Planning activities



7.2.2.2 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 will come under formal change control. Once the overall scope has been defined, the scale and complexity of the project will be evident, and an approach can be decided on how planning should be undertaken. Key in this is the selection of the tools to be used for planning and the form the plan should take.

7.2.2.3 Developing the project 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 the hierarchical description of the work packages in the project plan (see also **5.1.3**). 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, may 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) a schedule of costs by cost element;

j) reporting requirements.

NOTE Whilst this subclause specifically refers to "WBS", 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.

7.2.2.4 Determining 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.

7.2.2.5 Determining the sequence for the activities

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

7.2.2.6 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.

7.2.2.7 Identify resource requirements

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

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

7.2.2.8 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.

7.2.2.9 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 objects 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.

7.2.2.10 Monitoring ongoing delivery and viability

Once a 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 **7.2.3** to **7.2.7**.

7.2.3 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.

7.2.4 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, will ensure that the project achieves 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 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;

e) if benefit realization starts within the period of the project, measure benefits actually achieved. This will be the case if an extended project lifecycle is used (see **6.3**).

7.2.5 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;

d) identify risks and issues which might cause the project to slip and take corrective action, as appropriate.

The schedule may be presented as an outline or detailed bar chart that may 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 may 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.

Each task should contain within its definition the means to measure the progress. 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.

7.2.6 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 (see **7.2.13**). 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 will 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.

7.2.7 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;

d) identify risks and issues that might cause the project to over-spend, and take corrective action as appropriate.

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

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

7.2.8 Managing risk

The purpose of risk management is to ensure that the project objectives are likely to be achieved. It should include both threats and opportunities. Risk management should be undertaken throughout the project life 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 management plan, how risks are to be managed;

b) confirm risk context and business objectives;

c) identify the risks to meeting the project 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;

i) escalate significant risks to higher authority for management.

The project sponsor can never be certain that the anticipated benefits will be fully realized, however well a market is researched or the project 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. For this reason alone, the project sponsor will always be the primary risk taker. However, projects often exist in unpredictable environments and the project manager will also experience risk in undertaking the project. 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?

Only then can effective management action be taken to deal with them by means of carefully designed risk treatment measures.

Some risks will 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.

NOTE BS 6079-3 gives an explanation of the activities involved in project risk management.

7.2.9 Managing issues

The purpose of issues management is to ensure that unforeseen events do not negatively impact the achievement of the business objectives.

Issues management should be undertaken at all levels in the project team, with escalation to higher levels where necessary to ensure the issue is addressed. The accountable manager should:

a) log all identified issues and analyse them to determine whether the issue is a legitimate threat to the project objectives. If it is, the impact the issue will have on the project objectives should be determined, and accountability assigned for resolving the issue;

b) ensure that the issue and its impact are investigated to determine possible ways for resolving it;

c) identify and log subsidiary issues or risks 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) ensure that issues are monitored until resolved;

e) escalate significant issues to higher authority for management, if they cannot be resolved.

Issues may be raised at any level in the project hierarchy; for example, a project manager may raise a project level issue and a team manager a work package level issue. These may be raised to highlight situations which threaten project success. If an issue cannot be resolved by the accountable manager, it should be escalated to a higher level manager.

7.2.10 Controlling change

The purpose of change control is to ensure that the objectives, benefits, scope, schedule and cost baselines for the project are defined, mutually consistent and reflect the current status of the project at any point in time.

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 **7.2.2** should be followed as rigorously for a change to an existing 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 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 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 may 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 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 jeopardize any contractual obligations.

7.2.11 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;

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.

7.2.12 Managing documentation

The purpose of document management is to ensure that all documentation received by the project team is logged and distributed, that all documents created are reviewed, approved and version controlled, and that documents which are no longer required are withdrawn.

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

a) define and set up the document control environment;

b) maintain the document register;

c) ensure that all received documents are registered and distributed to the appropriate people;

d) ensure that all key documents are reviewed and approved by the appropriate people;

e) ensure that documents which are no longer needed are withdrawn, and, where appropriate, retained;

f) ensure that documents are retained where there is a legal, regulatory or other requirement to do so.

7.2.13 Managing procurement

The purpose of procurement management is to ensure that any products or services which are bought as part of the resourcing of, or outputs from, the project:

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

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

a) determine the work packages which require procurement;

b) define the procurement approach that will be used for the products and service to be acquired (often called a procurement strategy);

c) select suppliers, usually against predefined selection criteria and in accordance with organizational policy;

d) define and close the formal agreement with the selected supplier;

e) undertake the obligations in the agreement, including payments;

f) monitor supplier performance and quality;

g) evaluate the supplier's deliverables and services;

h) accept delivery of the supplier's deliverables and services, ensuring delivery of all supporting documentation;

i) 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.

7.2.14 Managing quality

The purpose of quality management is to ensure that the outputs from the project are fit for purpose such that the project 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;

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 management plan. The quality plan should provide a quantified means of demonstrating that specific quality requirements are being addressed.

The host organization 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 management plan. Quality plans should be developed in the feasibility phase 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 also BS EN ISO 9001.

7.2.15 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 objectives.

The project 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 coordinate 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 coordinate 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 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 may 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 management plan in terms of time, cost and performance.

7.2.16 Managing stakeholders and communication

The purpose of stakeholder management is to identify and mange 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 and communications management 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 objectives, determining what is required from each, and understanding the relationships between them.

b) **Planning stakeholder engagement and communications**. Having determined who the stakeholders are, both as individuals and as groups, a means of engaging them should be planned. The stakeholders will fall into two 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 will be engaged in order to either neutralize 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) **Communicating**. The objective in communication is to address the target audience, with a specific message, in a way that they are likely to find acceptable. 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.

d) **Monitoring stakeholder engagement**. Validating the attitudes of stakeholders throughout a project is essential if the project objectives are to be achieved. As time passes, attitudes will 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 will only end after the outcomes of the project have become clear. 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.

8 Skills and competencies for project management

8.1 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 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	**Roles**					
	Decision makers (5.2.2)	**Project sponsor (5.2.3)**	**Boards and steering groups (5.2.4)**	**Project manager (5.2.6)**	**Team manager (5.2.7)**	**Team member (5.2.8)**
People management **(8.2.1)**		x	x	x	x	
Evaluation and decision-making **(8.2.2)**	x	x	x	x		
Planning and control **(8.2.3)**				x	x	x
Finance **(8.2.4)**	x	x	x	x		
Procurement and supplier management **(8.2.5)**				x	x	
Communications **(8.2.6)**		x	x	x	x	
Negotiating **(8.2.7)**		x	x	x	x	
Contracts **(8.2.8)**	x	x	x	x	x	
Legal **(8.2.9)**	x	x	x	x	x	
Domain understanding **(8.2.10)**					x	x
Leadership **(8.3)**		x	x	x	x	
Stakeholder management **(8.4)**		x	x	x	x	x
Team building **(8.5)**		x		x	x	
Conflict resolution **(8.6)**		x		x	x	

8.2 Typical competency areas

8.2.1 People management

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

a) being able to work cooperatively 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;

d) developing the skills of and encouraging the individual project team members.

8.2.2 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;

c) understanding the project objectives, establishing the correct priorities and choosing the most appropriate course of action.

8.2.3 Planning and control

Planning and control skills include:

a) the ability to identify problems and opportunities;

b) making the best use of available resources to achieve the project objectives;

c) encouraging the project team members to set personal objectives with respect to planning, organizing and time management methods;

d) being familiar with modern estimating, planning and monitoring tools and techniques.

*NOTE See **7.1** for guidance on integration activities and **7.2.2** for guidance on planning.*

8.2.4 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;

e) being familiar with finance treasury activities including financial bonding, foreign exchange and taxation.

8.2.5 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;

d) supply chains and logistics.

*NOTE See also **7.2.13**.*

8.2.6 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;

h) understanding non-verbal communication.

*NOTE See also **7.2.16**.*

8.2.7 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;

d) able to influence and persuade stakeholders.

8.2.8 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;

f) ability to manage subcontractors.

8.2.9 Legal awareness

Individuals need to be aware of any statutory requirements that could affect the project (see **4.6.1**).

Legal skills include:

a) a knowledge of EU 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;

e) an understanding of when and how to instruct legal advisors.

8.2.10 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.

8.3 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;

e) being competent at running effective meetings and communicating.

8.4 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 will in some way be changed as a result of the project. The core skills set for effective stakeholder management includes:

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

*NOTE See also **7.2.16**.*

8.5 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.

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;

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;

7) reduce difficulties and obstacles.

8.6 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;

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 may be engaged to broker a resolution.

8.7 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.

Annex A (informative)

Agile and iterative methods in the context of project management

Plans for projects tend to be based around the assumption that sufficient is known about the outputs to enable the complete project to be planned from the start. In most cases, however, the requirements are not sufficiently well defined, nor the solutions understood, until later in the project. It is for this reason that a phased approach to projects is used (see **5.3** and Clause **6**), with the early investigative stages being used to detail the requirements and refine the solution. However, there are situations where even a phased approach with formal "design and build" phases is not appropriate. In these cases, alternative approaches to the project are required.

Iterative development is used in such cases, where the requirements are not well understood and so some form of piloting is necessary to clarify requirements. In iterative development, a prototype of the project output is created to enable stakeholders to understand what is proposed and clarify their requirements. This enables a more detailed, and possibly working, solution to be developed. Iterative development and modification continues until the stakeholders are satisfied that the output will enable them to meet their business needs.

Agile development may be regarded as a specific instance of incremental development and is used mainly in software development (but has been extended to other areas) where project teams need to respond to rapidly evolving requirements. This approach most commonly aims to deliver source code (or outputs) in small packages that the stakeholders can evaluate. It differs from the normal form of iterative development in that the code or output is not a static prototype, but a working version. All agile methods focus on short cycle development with frequent feedback loops in order to maximize understanding and learning of the whole team (project team, customer/client and other stakeholders as appropriate). The methods typically advise setting out work packages for multi-functional, semi-autonomous teams to undertake. The project manager then acts in the role of facilitator, allowing teams to develop their own solutions within the overall framework of a high level project plan and business case, using the guidance provided in this standard.

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