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Project management —

Part 1: Guide to project management

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- Institute of Quality Assurance
- Institution of Civil Engineers
- Institution of Incorporated Engineers
- Institution of Mechanical Engineers
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Foreword

This British Standard has been prepared by Technical Committee MS/2. It supersedes BS 6079-1:2000 which is withdrawn. BS 6079 is issued in four parts:

- *Part 1: Guide to project management;*
- *Part 2: Vocabulary;*
- *Part 3: Guide to the management of business related project risk;*
- *Part 4: Guide to project management in the construction industry¹⁾.*

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

This revision focuses on the importance of earned value and procurement and their application to the project management process.

This British Standard 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.

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 does not in itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 57 and a back cover.

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¹⁾ In the course of preparation.

Introduction

Project management could be said to be as old as humankind since, by definition, any management activity that introduces a new objective or causes change and has a definite start and finish time is a project.

This standard provides guidance for:

- General managers: in organizations that operate projects: to raise awareness of the problems that are likely to exist within their own environment in the management of projects and to enable them to provide appropriate support for the project manager and team.
- Project managers: responsible for achieving the defined project objectives: to improve their ability to cope with the many problems that occur (only some of which may be foreseen) and encourage better integration between the different disciplines taking part.
- Project support staff: coordinators, planners, designers, cost analysts, quality auditors, technicians etc; to help them to understand the problems that may occur in their project environment, and to provide possible solutions to those problems.
- Educators and trainers: those engaged in the teaching of network-based and other techniques for project management who need to understand the industrial context in which these techniques are used.

This standard aims to draw attention to the management problems encountered in different project environments and to present possible solutions to these problems. Since there are no panaceas in project management, the solutions presented should be treated as guidance only; they may need to be adapted to suit the particular circumstances for which they are being considered. The only certainty in a project is that, without the full support of management for the project team and the appropriate choice and use of planning and control techniques for the project, it will usually fail to achieve its objectives. The guidance given and the principles of project management described are applicable to all sizes of project.

1 Scope

This standard gives guidance on the planning and execution of projects and the application of project management techniques. It has broad relevance to projects in many industries and the public sector, both at home and abroad. This standard aims primarily to provide guidance for relative newcomers to project management and to act as an aide-mémoire for more experienced practitioners and those who interact with project management teams.

The principles and procedures outlined are relevant to all sizes of organization, although they may not cover all aspects of every conceivable type and size of project.

Application of these principles and procedures in different industries may have unique and particular emphases and priorities.

It is highly recommended that this standard be used in conjunction with BS 6079-2.

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 6079-2:2000, *Project management — Vocabulary*.

3 Terms and definitions

For the purposes of this standard the definitions given in BS 6079-2:2000, apply, together with the following.

3.1

configuration management

technical and organizational activities comprising:

- configuration identification;
- configuration control;
- configuration status accounting;
- configuration auditing

[BS EN ISO 10007:1997]

3.2

matrix organization

structure in which individuals, groups and managers continue to work within their specialist functional departments, but are assigned to work full-time or part-time under the direction of a project manager who is not their line manager

NOTE Such assignees are usually responsible to the project manager for their project work and to their functional manager for other activities.

3.3

project

unique process, consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including the constraints of time, cost and resources

NOTE 1 An individual project may form part of a larger project structure.

NOTE 2 In some projects the objective(s) is (are) refined and the product characteristics defined progressively as the project proceeds.

NOTE 3 The outcome of a project may be one or several units of product.

NOTE 4 The organization is temporary and established for the lifetime of the project.

NOTE 5 The interactions among project activities may be complex.

[BS ISO 10006:1997]

3.4

project management activity (PMA)

operation, within a work package of a work breakdown structure (WBS), that is a specific action to be completed to aid the fulfilment of the project as a whole

3.5

programme manager

individual or body with responsibility for managing a group of related projects

3.6

project phase

part of a project during which consistent activities are performed to attain a designated objective. One of a series of distinct steps in carrying out a project that together constitute the project life cycle

3.7

variations management

monitoring, recording and assessing of variations to the scope or timing of a project, irrespective of who generated the change. The objective is to make all parties fully aware of the cost, time and quality implications of implementing such changes

NOTE Variations management is a term used in the construction industry. It is closely related to the more widely used terms “change management” and “configuration management”.

4 The corporate aspects of project management

4.1 General

Projects are the engines of change. The motive for change may stem from a perceived shortage of funds, changing patterns of demand, social pressures, technological advances, competitive and alternative suppliers of goods or services. There is little reason to suppose that these pressures will diminish; indeed some people would argue that the rate of change is likely to increase.

Those with management responsibility have to respond to these changes to survive, those who do it successfully will probably prosper, those who are slow or whose response is inadequate will decline and in due course fail.

As people in management take the series of decisions to move from where they are to where they want to be, or need to be, they will commit resources to the achievement of results they have not previously enjoyed. Each task will be unique in some aspect; opening a bank branch may not be novel to a major clearing bank but some single aspect, or combination of events involved in opening a particular branch will make it a one-off occurrence.

Thus the pace of change is causing corporate management to undertake more tasks with unfamiliar characteristics. Such decisions, for example to run with a series of projects of differing significance and durations, will test management skills. As the projects become more numerous, they are likely to run across departmental boundaries and will tend to become more expensive. Such a bundle of activities creates significant managerial problems and the purpose of this standard is to provide a guide to project management, based on best practices.

Research suggests that the overall track record of organizations in managing projects, including take-overs, leaves much to be desired. The delivery of results on time, within predetermined cost and of the requisite standard within set safety and quality criteria is less frequent than it should be.

This standard aims to help people in management deal with these situations more efficiently and effectively. The principles expounded in the standard are as relevant to small companies and small projects as they are to major enterprises with multi-million pound projects spanning several years.

4.2 Nature of projects

Projects may be revenue generating with consequences affecting the profit and loss account or, as more commonly understood, capital projects with the initial impact mainly on the balance sheet. The book-keeping conventions have little bearing on the management process.

The application of sophisticated project management techniques to projects in government and industry has become necessary to ensure the achievement of business, economic, environmental, strategic and political goals. The benefits of project management techniques are not restricted to large projects. Such techniques, like all good management practices, can usefully be applied to a project regardless of its size. It is often the case that major projects are broken down into smaller projects with a subcontractor, who thus becomes part of the project management plan of the parent organization and should be able to demonstrate competence in this area when tendering for the business.

A project is a means to an end. An enterprise may need, for example, to enhance income, and/or reduce costs, and/or improve productivity with reasonably clear ideas of the extent to which change has to be brought about. An understanding of the objective by the appropriate personnel should bring alternative ways of achieving or maybe even exceeding the objective.

Following a review of the alternatives and their respective consequences, senior management will decide on their preferred course of action and issue instructions to a responsible person for work to proceed. In due course, perhaps on time, or early, or late, the project will be declared complete and its outputs will usually become the responsibility of someone else. The ensuing results may or may not justify the expenditure that has taken place, which may or may not have been within agreed limits.

In some cases the time delay in completion leads to such excessive costs that the project in its operational mode will never deliver an adequate return.

Understanding the nature of projects may enhance the ability of people in management to handle them.

There are several attributes of projects, as follows:

- a) they are non-repetitive and tend to have significant unique features likely to be novel to the management;
- b) they carry risk and uncertainty;
- c) they should be approved in return for undertakings to deliver specified (minimum) quantified results within pre-determined quality and safety/health parameters;
- d) the authorization should leave no doubt that the results will need to be delivered with firm start and finishing dates, within clearly specified cost and resource constraints;
- e) they are usually in the hands of a temporary team and may be subject to change as the work progresses;
- f) in a long duration project, events inside and outside the enterprise may affect the outcome.

4.3 The work to be done

In any organization, whether private or public sector, service or manufacturing, software or hardware, it is necessary to plan, control and implement tasks to achieve a given objective. Although the concepts and basic principles of project management are universal, they have to be tailored and adapted to suit the particular circumstances of any project. This guide describes a full 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.

To ensure success, the management of a project should be entrusted to an individual with a knowledge of the particular requirements of a given project and with certain essential personal attributes. This guide defines the basic skills to look for when selecting a project manager and the project team.

Effective project management may be broken down into five elements:

- planning;
- organizing;
- motivating;
- implementing;
- control by review and accountability.

Senior management is responsible for establishing the objectives and constraints within which the project has to be delivered. They should set realistic criteria and ensure that adequate planning has been done. This should establish the proposed expenditure and test the realism and acceptability of the expected benefits being put forward as justification.

Sub-standard project performance often results from failures at the planning stage causing a series of subsequent alterations/clarifications that push up expenditure and create delays.

Increasingly, projects cut across departmental boundaries, in these cases management has to ensure that the appropriate organization is in place to run a project. This organization will often be a temporary arrangement, but will generally call for a project manager supported by a team of staff with the appropriate skills for the needs of the project.

The authority delegated to the project manager should be clear and because it will cover the team assembled from departments, that authority should be notified throughout the enterprise. Without this authority the project manager may be thwarted by departmental intransigence.

Working in a project team has been found to be an excellent capacity enhancing experience for departmental staff and may be seen as a valuable development method in career planning. On major projects it is not always possible for departmental staff to both make the required contribution and maintain departmental responsibilities, as a result they may be seconded to a project on a full time basis.

Management should consider the motivation of staff when they are taken out of their departmental roles. Tangible rewards related to the achievement of the project within the set constraints may involve money, but in an appropriate culture other rewards might include the kudos of being selected to work on a project, of promotion to wider responsibilities following success in a project team, etc. Where staff are deployed on a full time basis there should always be an understanding that, as a minimum, a return to previous duties is safe.

Having agreed to run with a project and after an appropriate structure and pattern of motivation has been set up, management should issue instructions to proceed. The work of implementation can then begin. People will be deployed, materials bought and services secured.

Senior staff should, without becoming directly involved in the detail, ensure that proper operational procedures and controls are in place and being used. They should normally insist on reports at predetermined intervals, usually set as a condition of authorization, showing the current state of affairs and the latest expectation of completion in terms of at least cost and time. These reports will typically form the basis of reviews and the exercise of accountability with the project manager. These reviews will close one cycle and lead into the next cycle of replanning, to take account of changed circumstances, deal with problems and exploit opportunities.

4.4 The project life cycle

4.4.1 General

All projects tend to go through a similar life cycle. In large schemes the elements may be very clearly separated, in smaller works they may be linked and/or blurred. Different industries have their own terms. However, in general, it is useful and possible to identify the work that is carried out, as follows:

- a) conceptualization and basic ideas;
- b) feasibility tests for technical, commercial and financial viability;
- c) evaluation and application for funds and stating risks;
- d) authorization and setting any conditions;
- e) implementation including design, procurement, fabrication, installation etc.;
- f) control/accountability, periodic reviews and updates;
- g) completion and handover to client;
- h) operation and inclusion in normal revenue planning/control procedures;
- i) close down and cease operations;
- j) termination including disposal of residual assets (liabilities).

Some organizations are very successful in generating ideas for improvements, some are adept at converting those ideas into reality. The most successful do both, often by tapping into the knowledge and experience of their own workforce. Basic concepts will arise from solving current problems and also from identifying opportunities. Management should give encouragement both by tangible and psychological rewards.

For more detailed consideration of the project life cycle, see Clause 7.

Figure 1 shows a typical arrangement of project phases, stages and milestones.

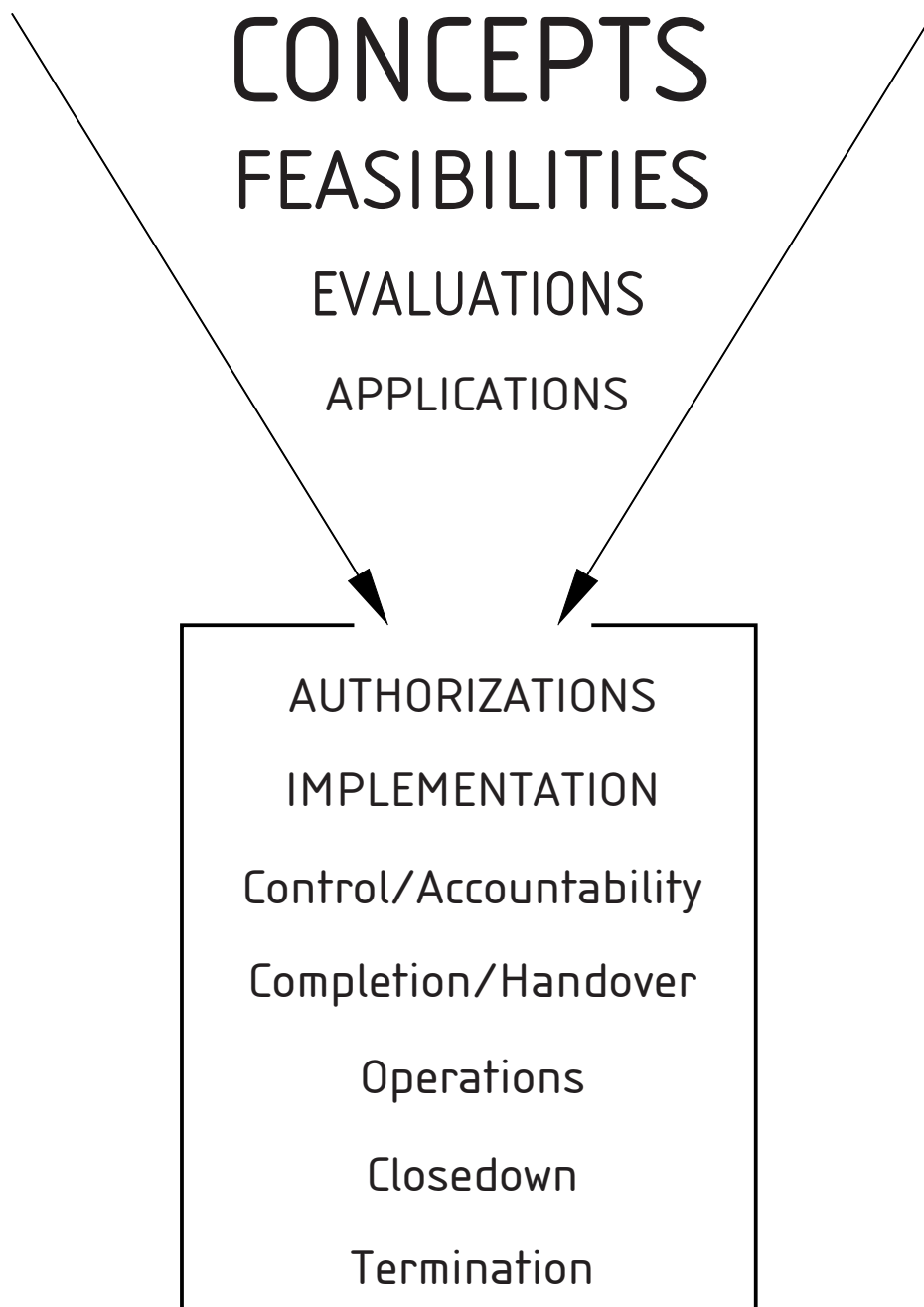


Figure 1 — Arrangement of project phases, stages and milestones

4.4.2 *Project concept*

Each concept should undergo a screening process to test its viability in at least three different ways. This process should involve establishing:

- a) if the project is technically feasible;
- b) if it would be commercially and financially acceptable; and
- c) if the costs and benefits show a balance that makes the risks of proceeding worthwhile.

This screening process, which will result in a business case being made, should be refined as the project proceeds from one authorization stage to another.

4.4.3 *Evaluating the project's feasibility*

In the first instance the feasibility study will be approximate as the prime purpose is to identify those ideas that look promising and separate them for closer attention from those which fail the tests. The schemes that offer promise should then be subjected to more demanding evaluation which will take up rather more of the time of the staff concerned. In many organizations those projects which survive a more rigorous examination will be brought to the notice of a senior manager who can, if so persuaded, champion the project and secure agreement for further progress.

The activities in this phase will usually take the form of extended planning and a full evaluation. Organizations often find this is an appropriate time to select someone to run the initial project work. Frequently the person selected will become the project manager if the scheme proceeds. It would be that person's responsibility to assemble an interim team to provide the required inputs from disciplines such as marketing, sales, production, personnel and finance. The output would be collated in financial terms and critically examined. The champion would seek authority to proceed only when satisfied with the plans that had been drawn up. These plans might be expected to incorporate critical path analysis (CPA), an evaluation of net present value (NPV) using appropriate discount factors and a review of the sensitivity of the project to attendant risks.

Larger organizations tend to have tiered authorities, each capable of authorizing projects up to a set value and recommending higher amounts to senior management. In agreeing authorization, management will usually set conditions and constraints. One of the most important means of formalizing these conditions and constraints will be the timetable for reporting progress against key events or milestones. Funds will be earmarked and in large projects they may be released on a cumulative basis and triggered by the receipt of satisfactory progress reports from the project manager.

4.4.4 *Project implementation, handover and operation*

As implementation proceeds management will be aware that the only certainty in projects is the consequence of the costs and liabilities being incurred. The promised deliverables can only come later in the implementation phase. Hence there should be competent project progress reports at sensible intervals with review meetings for the exercise of accountability.

When the implementation is complete, management will usually require some degree of formality in handing over the project from the team that handled its completion to those responsible for its future operation. It is not uncommon for this next stage to last for a sustained number of years. Concurrent with the handover, a succinct and honest report on the history of the project up to that stage can be helpful in identifying strengths and weaknesses to aid future project management planning and control procedures.

At handover the project team may be disbanded or switched to other projects. The subject of their efforts will be absorbed into the normal budgeting, revenue planning and control systems until the operation ceases, for example due to technical obsolescence, market changes, simple plant life expiry, etc.

4.4.5 *Terminating the project*

In most cases, closing down the project may be simple and straightforward, but in a minority of instances final termination may be a major event, and probably becomes a project in its own right. Items such as North Sea oil platforms, nuclear installations in submarines and power stations have major termination consequences. This is why their financial appraisal should be a whole life assessment to allow for what may be massive termination costs.

4.5 The benefits of project management

Good project management has proved to be an effective and efficient way of managing change in many types of organization. It allows senior management to accomplish the following:

- a) direct scarce resources to what are judged to be the most desirable objectives;
- b) focus appropriate management skills on specific tasks;
- c) secure commitments to deliver results from those wishing to proceed with the project;
- d) direct major elements of the business without being submerged in detail;
- e) keep control of a wide variety of projects running concurrently;
- f) ensure that issues such as quality and safety are engineered into projects at the design stage;
- g) extend the experience of staff working on projects and help equip them for wider responsibilities;
- h) identify and manage risks.

NOTE Later sections of this standard pick up and expand the points made here, in a detailed manner that is more attuned to assisting the operators of project management activities.

5 Project and company organizational structures

5.1 General

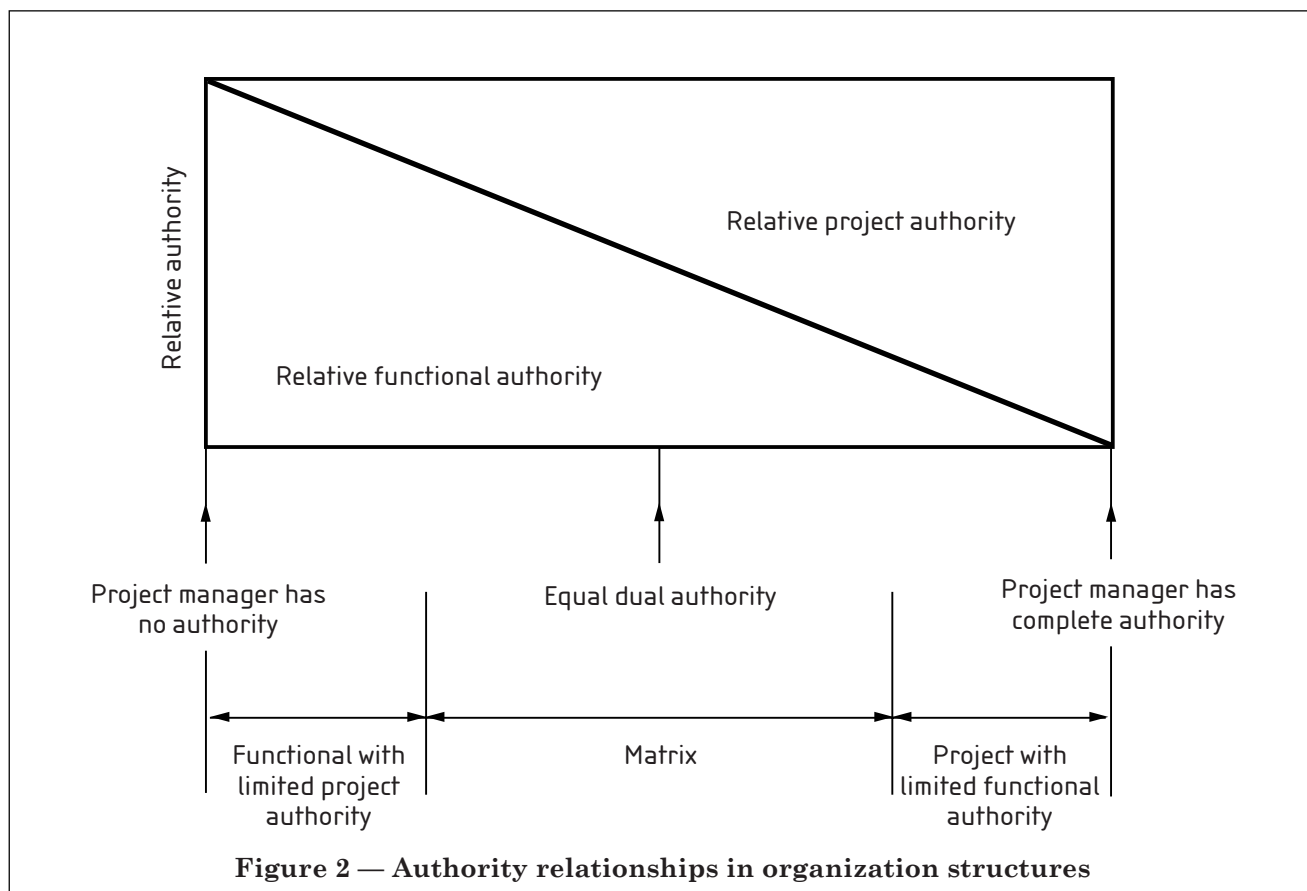
Any group that provides a service or produces a product forms itself into an organization with a structure. This structure, and the size of the organization, will inevitably affect the way the organization can respond to change and the introduction of projects.

The structural form of the organization will normally be hierarchical, apart from organizations set up specifically to provide project services, with an emphasis on the functional operations. With this form a small organization will always be able to respond more quickly to the need for change than a large one since the owner or chief executive will have delegated less authority for specialist decision making to the functional areas.

As the organization grows, this traditional form is characterized by comparatively routine and predictable working procedures, a relatively low rate of change, specialized functional staff and, because of this, significant reduction in the need for cross-functional communication and cooperation. This has caused major problems in the current industrial environment as quick response to market demand for new or updated products or services or changes in the level of existing supply or product mix are required. The increasing rate of change, coupled with competitive demand to shorten development cycles, has led to the introduction and growth of project management as an organizational form within the traditional structure and the development of the matrix structure.

Although project management structures are often incorporated within the traditional structure of hierarchical functional organizations, they have many of the same basic characteristics and share the same resources as the other functional areas. Such structures require a much higher degree of flexibility in working procedures because of the unique nature of projects. This flexibility is affected by the size and complexity of the project, its duration, its geographical location and the contract terms 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.



5.2 The hierarchical functional organization

In this type of organization, which is the traditional form for most manufacturing and process companies, there is usually no separate project function or organization. This form of organizational structure has existed for a long time and has significant advantages, with its simple reporting and centralized control, so long as the rate of change is slow and any projects are small enough to be contained within and serviced by one functional group. If the project enlarges and crosses functional boundaries, or the sheer number of projects overstretches the functional resources, then the disadvantages of this structural form become apparent. An ever increasing burden may be imposed on the chief executive, in particular due to the lack of cooperation and coordination that occurs between the functional groups.

In these circumstances the project manager may report directly to the chief executive and require the support of some specialist staff in undertaking the project. This of itself can cause problems for the chief executive as the functional heads will be reluctant to release suitable staff and the project manager will be reluctant to make do with inexperienced people. If or when the number or size of projects increases a permanent project function should be set up and even then there will still be the need to draw specialist assistance from the functional groups for various aspects of the project. For instance, in a hardware project, engineering design work will still be carried out in the appropriate functional groups and the coordination and timing of that work will be the responsibility of the project team in conjunction with the functional heads to whom the design staff report for their professional competence.

5.3 The matrix organization

The problem of coordinating project activities does not become serious until functional boundaries are crossed or functional resources are overstretched. Until this happens it is not worth making changes to the organizational structure just to accommodate single projects with what is known to be a limited life. Once it becomes clear that projects will continue to be carried out within the organization and that there may be several running simultaneously, then a different situation arises and a change of organizational structure becomes essential. It also becomes necessary to set up a project management function with its own functional group of project specialists.

Furthermore, if these dedicated functional specialists are required by many of the projects, they will be appointed as part of the group either by withdrawing them from the existing functional groups or by external recruitment. If such specialists are obtained internally, which if at all possible they should be, then it is essential that they be disengaged from their previous positions. Ideally the project group, like any other functional group, should be physically located in its own area, the functional specialists will then still be able to refer to the functional supervisors, but only for quality and functional technical problems.

In multi-project situations this structure is essential and, while it may solve many problems, some will remain; also some new problems are created, in particular that of dual reporting. However firmly a functional specialist is disengaged from a previous supervisor, some loyalty will remain and the supervisor can influence the functional specialist's career. This can often lead to a dual reporting situation: one official and one unofficial. If, for example, a functional specialist has an unresolved technical disagreement with the project manager, any appeal should then be made through to the senior manager who has authority over both the project and the functional specialist's supervisor. There should only be one reporting system for the project that is operated by the project team through the project manager. All communications with the sponsor or client should be through the project manager.

Changes in managerial behaviour required by the move to a matrix structure are far-reaching, stretching to the board itself. To ensure that different project teams and functional groups react in the same way to similar circumstances and that all have the same view or priorities, a strong corporate culture should be developed. This is not an easy or rapid goal to achieve, but without it there may be inconsistent behaviour between project and functional groups with possibly serious consequences. The project manager's challenge is to motivate staff, both those seconded from the different functional areas and those within the matrix, to achieve the required performance in the primary areas of performance, cost and timing of outputs.

Equally, it is essential that motivation and corporate culture are also monitored by the functional manager. The management structure should allow differing views on objectives to be identified and resolved and should encourage peer group discussion on key issues. In a matrix structure several managers may have authority over project work. The functional manager for "how" and "by whom", and the project manager for time, cost and performance. The responsibility remains with the project manager and much tact and patience may be needed from senior management and project sponsors to make the matrix structure work properly. In particular, clear policies should be established for the career paths of those seconded to the project teams, both on long and short term appointments.

5.4 The project organization

The pure project form of company organization is not common, however it can be employed with advantage where projects are the normal business of the organization. In this type of organization the project team usually remains as a multidisciplinary unit and is moved from one project to the next as each is completed. This has the disadvantage that there may be a failure to develop functional specialists and general managers within the organization which may result in some projects being starved of adequate specialists. This also means that the project manager and the project team may need to have a high degree of autonomy from the host organization and that the project manager has to be given almost total authority for the project within the constraints of the host organization's general policies and strategies.

This form of organization has the distinct advantage of being able to precisely define and control the project budget, with different policies for different projects. It also reveals the cost of management that is normally contained within the overheads of the organization.

5.5 Criteria for reorganization

5.5.1 General

Organizational changes involve transition from the current state towards a future state. Experience has shown that the time-scale for transition from, for example, a totally functional organization to a matrix organization can take from three to five years in a large organization.

The effective management of change involves developing an understanding of the current state, developing an image of the desired future state and moving the organization through the transition period. As much care should be devoted to the transition state as to the future state as both are critical. The two basic issues to be addressed in reorganization are what the change should be and how the change should be implemented.

5.5.2 *Politics of organizational change*

Political behaviour is a natural and expected feature of organizations. In the transition state these forces become even more intense as the old regime is dismantled and the new regime takes its place. Any significant change can upset or modify the balance of power among various formal and informal interest groups. The uncertainty caused by such changes can lead to ambiguity and increased political activity as individuals try to protect their own interests.

5.5.3 *Psychology of organizational change*

Organizational change involves the movement from something known towards something that is unknown and this is usually unsettling for the individuals concerned. Psychological attachment to the former organization should be recognized and time should be provided to disengage from the current state. Change can sometimes create a sense of loss and individuals should be able to work through their detachment from the current state.

Those involved may be concerned whether or not they will be needed in the new organization, whether or not their skills will be valued and whether or not they will be able to cope with the new situation. This stress and anxiety can create performance problems and may lead individuals to resist changes that they might otherwise support. Wherever possible, staff should be given reassurance regarding their roles in the planned reorganization.

A significant change in organization may disrupt the normal course of events within the organization. Such changes may also undermine existing systems of management control and make procedures seem irrelevant. Control is easy to lose during the transition from one state to another. As goals, structures and people shift, it becomes difficult to monitor performance and make correct assumptions that might otherwise be made during a stable period.

5.5.4 *Planning the transition*

The transition phase is characterized by great uncertainty and control problems because the current state is disassembled prior to full operation of the future state. Managers should coordinate the transition with the same degree of care, the same resources and the same skills as they manage any other project. The following list summarizes the actions to be taken during the transition state:

- a) develop and communicate a clear image of the future state;
- b) construct a statement that identifies the impact of the change on different parts of the organization;
- c) maintain a stable vision and avoid unnecessary changes and conflicting views;
- d) communicate, including information on future decision making and operating procedures.

These actions can be helped by the appointment of a transition (project) manager, allocation of specific resources for the transition, the use of a transition structured management system and a transition plan. The progress of the transition should be monitored and evaluated, with feedback of results via an established communication channel to the interested parties.

5.5.5 *Managing the transition*

Most formal organizational arrangements are designed either to manage the current or future states and not the transition state. Problems encountered in the transition state can relate to questions of power, anxiety and control.

Transition implies changes in the power structure of the organization with an inherent need to shape and manage political dynamics. Success depends upon the project manager's ability to:

- a) motivate individuals through good communication;
- b) obtain the support of key groups;
- c) demonstrate leadership support of the change;
- d) communicate using symbols, language and graphics;
- e) build in stability and reduce anxiety;
- f) allow time to prepare for change, send consistent messages, build support and encourage participation.

It is important that managers and team leaders are aware of their role as models, as through their behaviour they provide a vision of the future state and a source of identification for various groups within the organization. They should articulate the vision of the future state and provide support through political influence and needed resources. This can be achieved by creating dissatisfaction with the current state, so that it is recognized that the current state is not perfect and requires change to avoid unwanted economic and business consequences. It should also be achieved by motivating staff and recognizing that their participation, although time-consuming, yields benefits that can lead to improved decision making. The project manager should communicate constantly in this phase and encourage feedback.

6 The project management process

6.1 General

The project management process described in this standard is different from the traditional hierarchical line management process. Project management is a universal process that is as applicable to the design and construction of a hydro-electric power station as it is to the introduction of an information system for a bank or the design of a public transport system. Characteristically, the project management process is designed to minimize the risk of failure in terms of time, cost and product fitness for purpose.

This standard describes a generic project management process that makes no assumptions about the content, size, phase or organization of the project. The guidance given can therefore be applied to most projects, regardless of industry sector, phase, size, complexity or content. Project management plans are one of the critical outputs from the project management process and they are described in detail in **6.5**.

Figure 3 shows the typical stages in a project sequence. The diagram shows the sequence of major documents that are frequently prepared as part of the successful management of projects. The list does not include the usual management reports relating to progress, exceptions, technical performance, quality, inspection, costs, expediting, commissioning and minutes of meetings.

The sequence of major events starts after the inception phase of the project life cycle and ends at the handover phase, i.e. before operations.

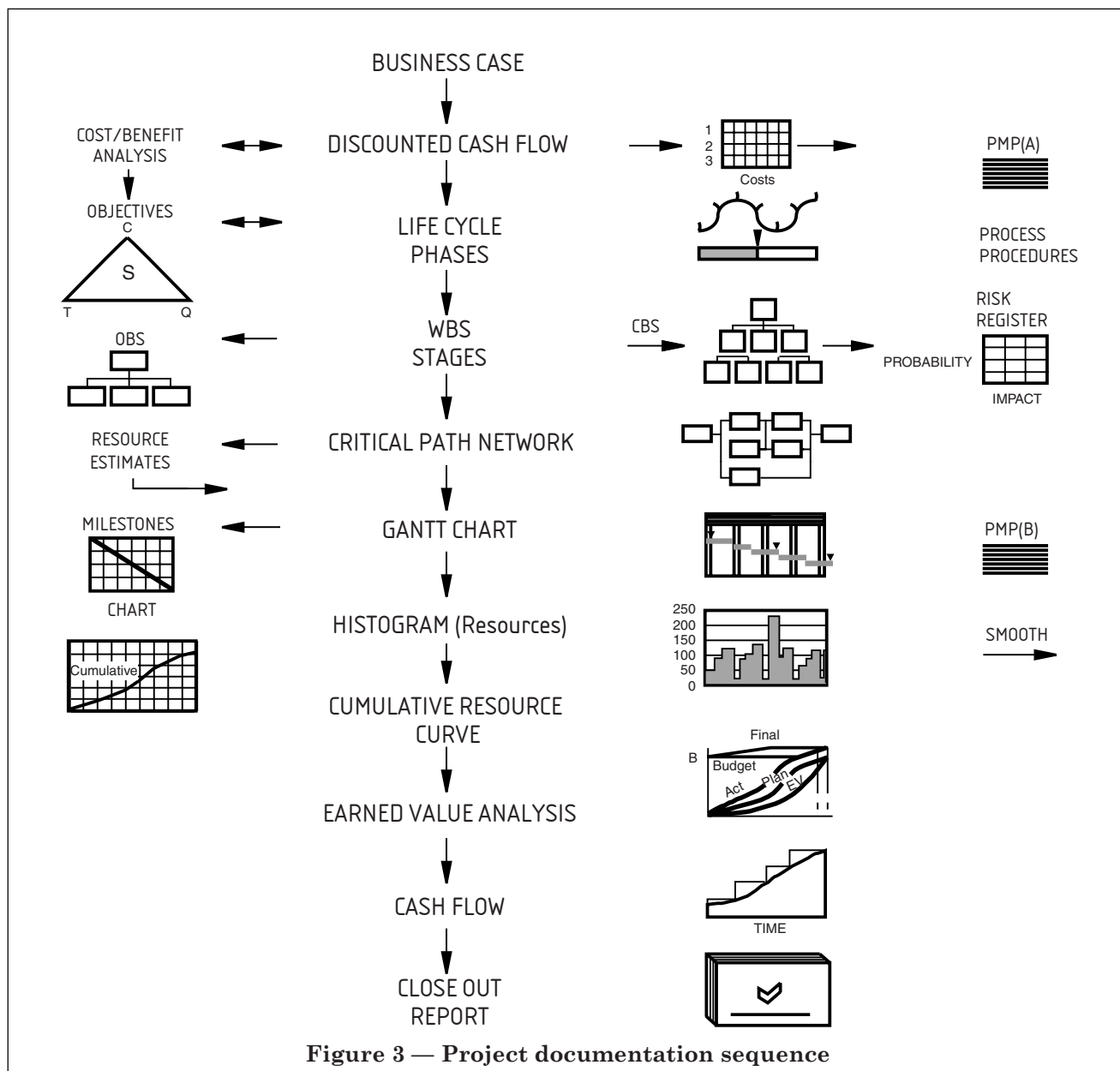


Figure 3 — Project documentation sequence

Once a decision has been made to give a project serious consideration, a business case is prepared. This would include the cost/benefit analysis, major risk analysis, financial analysis incorporating a discounted cash flow (DCF) study, and possibly a preliminary feasibility study which can all form part of a preliminary project management plan (PMP).

Once the authority has been given to go ahead with the project, the project manager can augment the PMP (which is a live document). The PMP should include a project life cycle diagram listing the project phases, the project objectives (in terms of cost, time and quality) and the processes and procedures to be employed.

The relevant phases, especially the implementation phase, should be broken down into the work breakdown structure (WBS), cost breakdown structure (CBS) and organization breakdown structure (OBS). The WBS can then be used to carry out a further risk analysis culminating in a risk register.

The stages from the WBS should then be broken down further to enable a critical path network and resource estimation to be produced. These can in turn be converted into Gantt charts, milestone slip charts and resource histograms.

These aids can then be used to produce cumulative resource curves, cash flow tables and curves etc.

6.2 The project management process: introduction

Projects do not succeed just by assiduous adherence to a mechanistic process. The successful project should be managed with enthusiasm, vision, single-mindedness and integrity. The project manager should be able to generate these qualities in the whole project team. It should be noted, however, that no amount of misdirected enthusiasm will avoid failure. The project management process described here mitigates this risk.

Project tasks exist at all levels within the project. A WBS helps to describe project tasks in terms that are easily understood by all those involved. At the top of the WBS a single task can represent the complete project while tasks at the base of the WBS may represent detailed work undertaken by an individual. This concept is described later in this clause.

The project management process and project management plan described here can be applied at all levels of the WBS. Thus, although the focus of this section is the process and plan used by the project team the guidelines for both process and plan can be used at any level within the project.

The project management process can be divided into two parts, project management planning and project control. Project management planning is the development of a workable project management plan that describes project tasks in terms of “who does what”, “when”, “at what cost” and “to what specification”. This integrated plan of the project should be at a level of detail that the project manager considers necessary and sufficient to enable effective and efficient project control. The second part of the process is to use the plan to control and coordinate the progress of the project.

There are further subordinate processes contained within both planning and control and, depending on the circumstances of the project in question, each process will make a greater or lesser contribution.

The process of creating and using project management plans is usually the responsibility of the project manager, assisted and advised as necessary by the 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 during the project life cycle. It should be noted that the more planning done before contractual obligations are established, the less risk there is of failing to meet those obligations.

6.3 The project management process: planning

6.3.1 *Obtaining authorization to proceed from the project sponsor*

It is essential to apply for and obtain authorization from the sponsor or a board of management to implement the project. Authorization may be given by the project sponsor for the whole project, project phase or in stages for work up to specified milestones, at which point further authorization will usually be dependent upon satisfactory progress.

6.3.2 *Establishing the project organization*

Projects may evolve within organizations that already have the structure necessary to support project work. Such organizations may be oriented exclusively towards projects or, more commonly, may adopt a matrix structure with the enterprise giving an equal and balanced emphasis to both the project team and the specialist functional departments that undertake work for different projects. A well designed and managed matrix structure should have the advantage of generating creative tensions between the project and functional disciplines. Functional areas usually demand clear and unambiguous statements of requirements from the project team and project teams usually demand a positive commitment from the functional areas concerning project duration, costs and performance. Subcontractors may be treated in the same way as an in-house function except that relationships between the subcontractor and the project manager will usually be subject to formal contract.

Alternatively, the project may have emerged as a separate entity without the support of an existing organizational structure. This is the case, for example, when a consultancy undertakes a project for a customer and where the work is done by third party agencies.

The project manager should establish mutual accountability between the sponsor, suppliers, task owners and the project team and, if necessary, written terms of reference. The following organizational factors should be defined:

- “Limits of authority”:

The project manager should clearly understand the limits of authority for any action that is initiated. For example, financial limits may be imposed by the sponsor or some organizations may prescribe lists of approved suppliers that limit the freedom of choice of subcontractor. The project manager may also be

constrained in the action that may be taken against defaulting suppliers. In order to operate effectively, the project manager should understand clearly how the freedom to act is constrained. Such limits should be stated in writing and form part of the project management plan.

— “Incentive mechanisms”:

Payment for goods and services is a critical part of project management. Payment terms may often be defined by the contract and the project manager should be aware of the leverage that can be exerted by terms that focus suppliers on delivery to time, cost and performance parameters. Because projects are usually bound by strict timescales, the project team should be allowed adequate time to assess the quality of purchases before payment is authorized. It is essential, however, that suppliers are paid promptly and strictly within the timescales stated in the purchase order.

Incentive, or premium payments, designed to accelerate critical activities that have a direct effect on overall project performance, can offer both supplier and project manager mutual benefits. Late delivery, cost overrun or failure to meet specification may therefore be penalized, where appropriate, to focus supplier efforts on project goals. The project manager may also seek the right to retain payment until a period has elapsed during which time the goods and services being purchased can be assessed for fitness for purpose. The purchaser should ensure the supplier has a clear understanding of incentive mechanisms, which should be reflected in the contract. More guidance on procurement functions is given in 6.6.4.

— “Communication framework”:

Success or failure of a project tends to depend on how well various members of the project team communicate with each other. It is essential for the project manager to implement an effective communication network designed to enable all relevant parties to report progress, express concerns and discuss how to achieve the project objectives. The project manager should identify a structure and schedule of meetings, each with their own terms of reference, list of attendees and agendas.

All project management team members should recognize that effective communication is a two-way process. Suppliers should be encouraged to raise concerns at the earliest opportunity, rather than waiting until a problem has matured into an intractable hazard. The project manager should promote an open forum for the discussion of issues. Suppliers and task owners should not be made to feel so intimidated that they are prevented from discussing bad news or raising doubts about their ability to achieve specific objectives. More guidance on project organization is given in Clause 5.

Figure 4 shows the project management process flow.