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STRATEGY	<i>CIOB</i>
CONCEPT DESIGN	<i>RIBA</i>
CONCEPT	<i>BIM DIGITAL PLAN OF WORK 2013</i>
DEFINITION	

Stage checklist

Key processes:

- Project governance parameters
- Project strategy
- Project organisation and control
- Accountability and responsibility
- Selection and appointment of project team
- Procurement strategy
- Tender procedures
- BIM strategy
- Project execution plan

Key objective:

- 'How will the need be realised?'

Key deliverables:

- Project execution plan

Key resources:

- Client team
- Project manager
- Specialist consultants

Stage process and outcomes

This project manager-led stage takes the client's preferred project option which received approval at the completion of the feasibility stage and develops firm proposals defining how the development will be implemented. Determining how the project will be implemented and managed is a fundamental element of the project management role. This process involves establishing the project infrastructure in terms of defining the mechanisms for managing and controlling the project, assembling the team who will execute the project, and collating all information to clarify the client's detailed requirements as a precursor to the design process.

Essential to this stage is the production of a project execution plan (or project management plan) which confirms the project strategy and the manner in which the project will be implemented.

Outcomes:

- project implementation strategy
- project definitions and procedures
- selection and appointment of project team
- employer' requirement document
- facility management strategy
- project time schedule
- project capital budget
- project risk register
- health & safety plan & file
- procurement strategy
- consultants scope of services
- project execution/management plan (PEP/PMP)
- client approval to PEP/PMP
- client approval to proceed to the pre-construction stage

Client' objectives

The aims for the client at this stage include setting up the project organisation, establishing the strategies for procurement, delivery (cost, time and quality control and risk management) and commissioning/occupation issues through identifying project targets, assessing and managing risks and establishing the project plan (Figure 3.1 and Figure 3.2).

Project governance

Project governance helps to ensure that a project is executed according to the standards of the organisation performing the project. Governance keeps all project activities transparent and ethical, and also creates accountability.

A project governance structure will also help to define a project reporting system. It outlines specific roles and responsibilities for everyone involved in the project. Project managers can leverage a governance structure in their projects to help with setting project priorities.

By understanding how governance fits into the larger organisation, a project manager can choose which objectives to pursue or indeed can gain support to change objectives that do not align with the overall organisational goal. By monitoring governance, the project manager helps to ensure that the project will stay in tune with organisational expectations and remains a good investment as it continues in its lifecycle.

A project manager can also use the steering committees or project boards that are part of most governance structures to resolve conflicts. As these high-level committee members do not work on the project on a daily basis, they can serve as fresh eyes to see what is causing the conflict and offer an outside voice of reason. They can also offer solutions on how to resolve the conflict and adhere to the standards – while still sticking to the overall goals of the organisation.

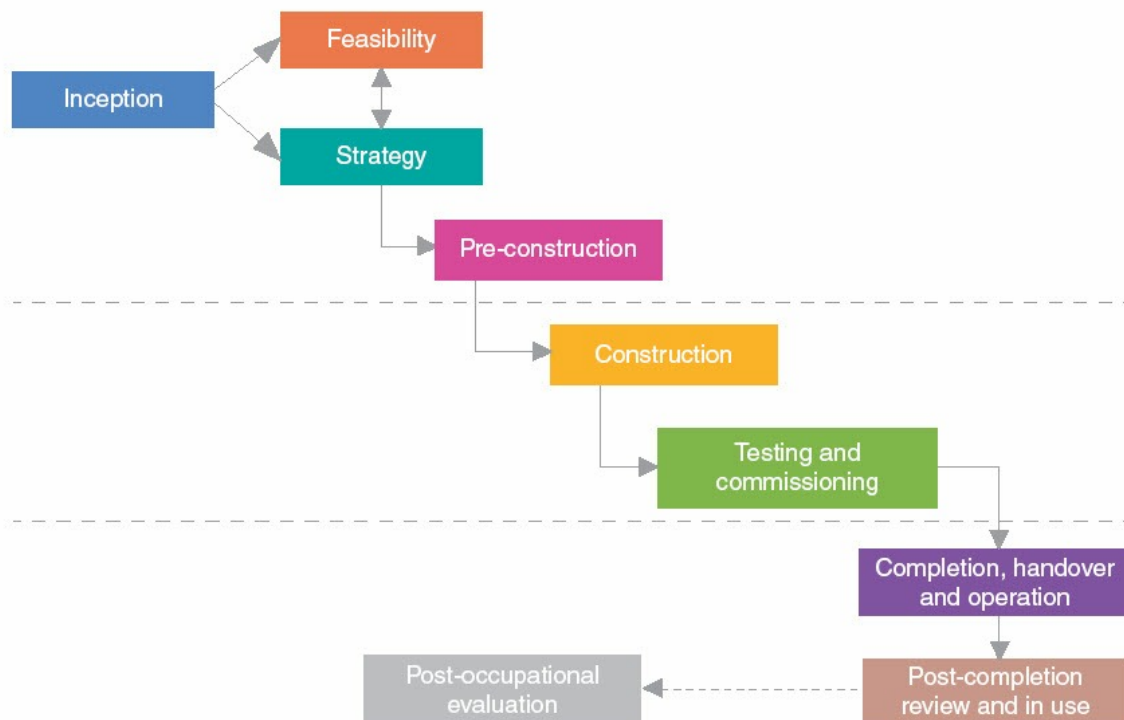


Figure 3.1 Stages of the project development

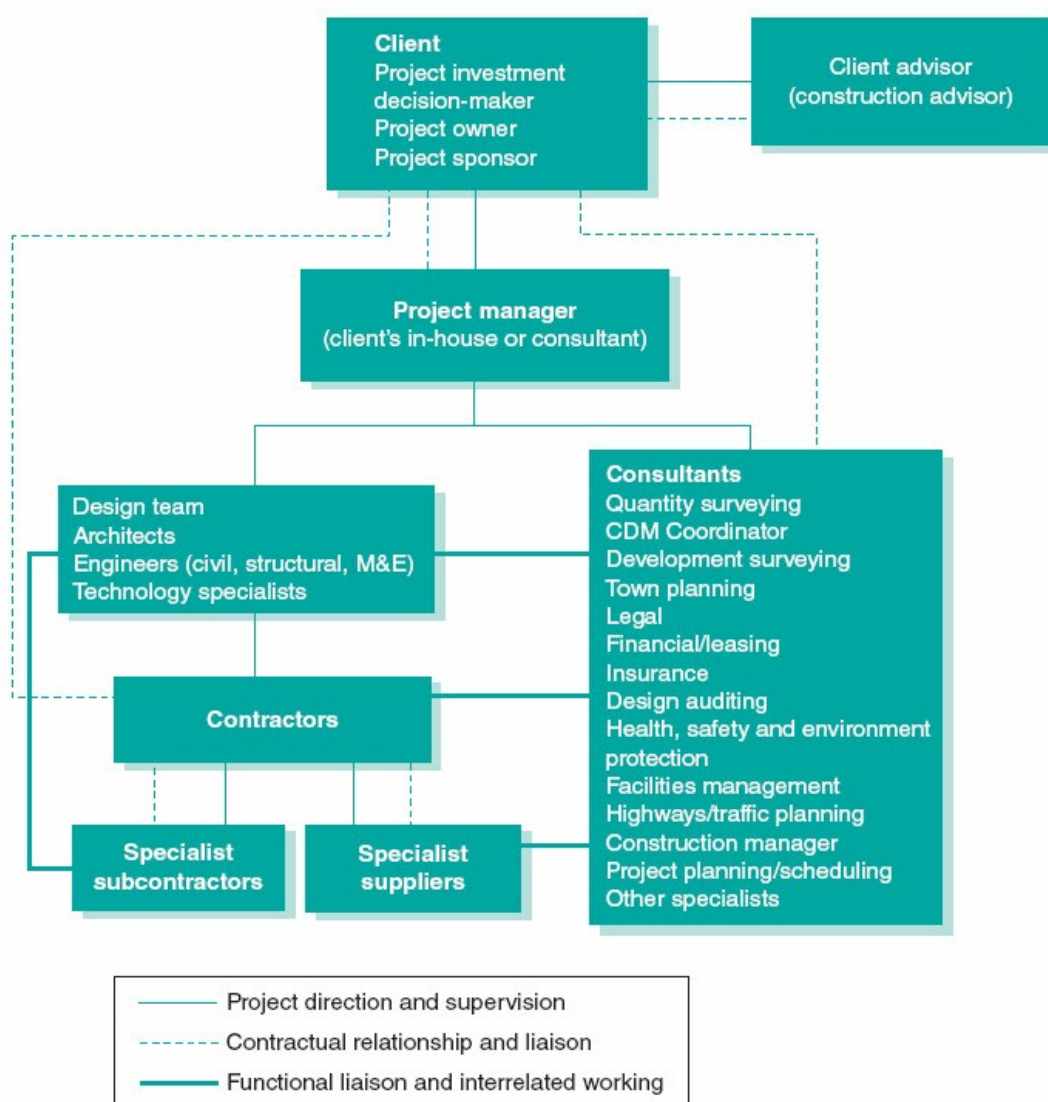


Figure 3.2 Typical Project Team Structure

Project governance extends the principle of governance into both the management of individual projects via governance structures, and the management of projects at the business level, for example, via business reviews of projects. Today, many organisations are developing models for 'project governance structures', which can be different to a traditional organisation structure in that it defines accountabilities and responsibilities for strategic decision-making across the project, often utilising the RACI model (Responsible Accountable Consulted Informed). This can be particularly useful to project management processes such as change control and strategic (project) decision making. When implemented well, it can have a significantly positive effect on the quality and speed of decision making on significant issues on projects.

Effective governance should create an environment where no project that is clearly exhibiting commonly accepted characteristics of project failure should be allowed to proceed to their next phase without clear resolution of those issues.

It is also worth considering that since corporate governance now places responsibilities on boards to monitor enterprise performance, there is a further responsibility of 'governance of project management'. This encompasses the need to control and demonstrate

- assurance that projects are being managed well and in accordance the requirements of governance across the enterprise
- assurance that portfolio management is optimising the return from corporate resource and maintaining alignment with strategic objectives
- assurance that strategic projects are not exhibiting (well publicised) conditions of project failure

The Association for Project Management states that there are four key component of project governance:

- portfolio direction
- project sponsorship
- project management effectiveness and efficiency
- disclosure and reporting

A 2011 publication by the Society for Construction Law mapped the common causes of project failure published in a 2005 report by OGC, against the four components of project governance as set out by the Association for Project Management (see Table 3.1).

OGC: common causes of project failure	APM: component of project governance
Lack of clear links between the project and the organisation's key strategic priorities, including agreed measures of success	1. Portfolio direction 2. Project sponsorship
Lack of clear senior management and the higher level ownership and leadership	2. Project sponsorship
Lack of effective engagement with stakeholders	2. Project sponsorship 3. Project management
Lack of skills and proven approach to project management and risk management	3. Project management
Lack of understanding of, and contact with, the supply industry at senior levels in the organisation	3. Project management
Too little attention to breaking development and implementation into manageable steps	3. Project management 4. Disclosure and reporting
Evaluation of proposals driven by initial price rather than long-term value of money (especially securing business benefits)	2. Project sponsorship
Lack of understanding of and contract with supply industry at senior levels in the organisation	3. Project management 4. Disclosure and reporting
Lack if effective project team integration between clients, the supplier and the supply chain	3. Project management

Table 3.1 Common causes of project failure

Strategy outline and development

A typical strategy stage consists of the main elements shown in Figure 3.3.

The project manager performs several principal activities at this stage which may include all or most of the following:

- Developing and reviewing the detail project brief with the client and any existing members of the project team to ascertain that the client's objectives will be met.

Preparing a final version in written form with supplementary appendices where these add to the general understanding of the issues that support the brief itself.

- Establishing, in consultation with the client and consultants, a project management structure and the participants' roles and responsibilities, including access to client and related communication routes, and 'decision required' points. This should be developed and presented in the project documents for the reference of all parties.
- Ensuring, in liaison with the client, the CDM coordinator, design consultants and the principal contractor when appointed, that appropriate arrangements have been made to meet the requirements of the Construction (Design and Management) (CDM) Regulations.
- Developing the client's performance brief for environmental sustainability including targets for recognised assessments such as BREEAM, LEED and Energy Performance, determining how this will be assessed and whether a specialist consultant such as environmental performance assessor should be appointed.

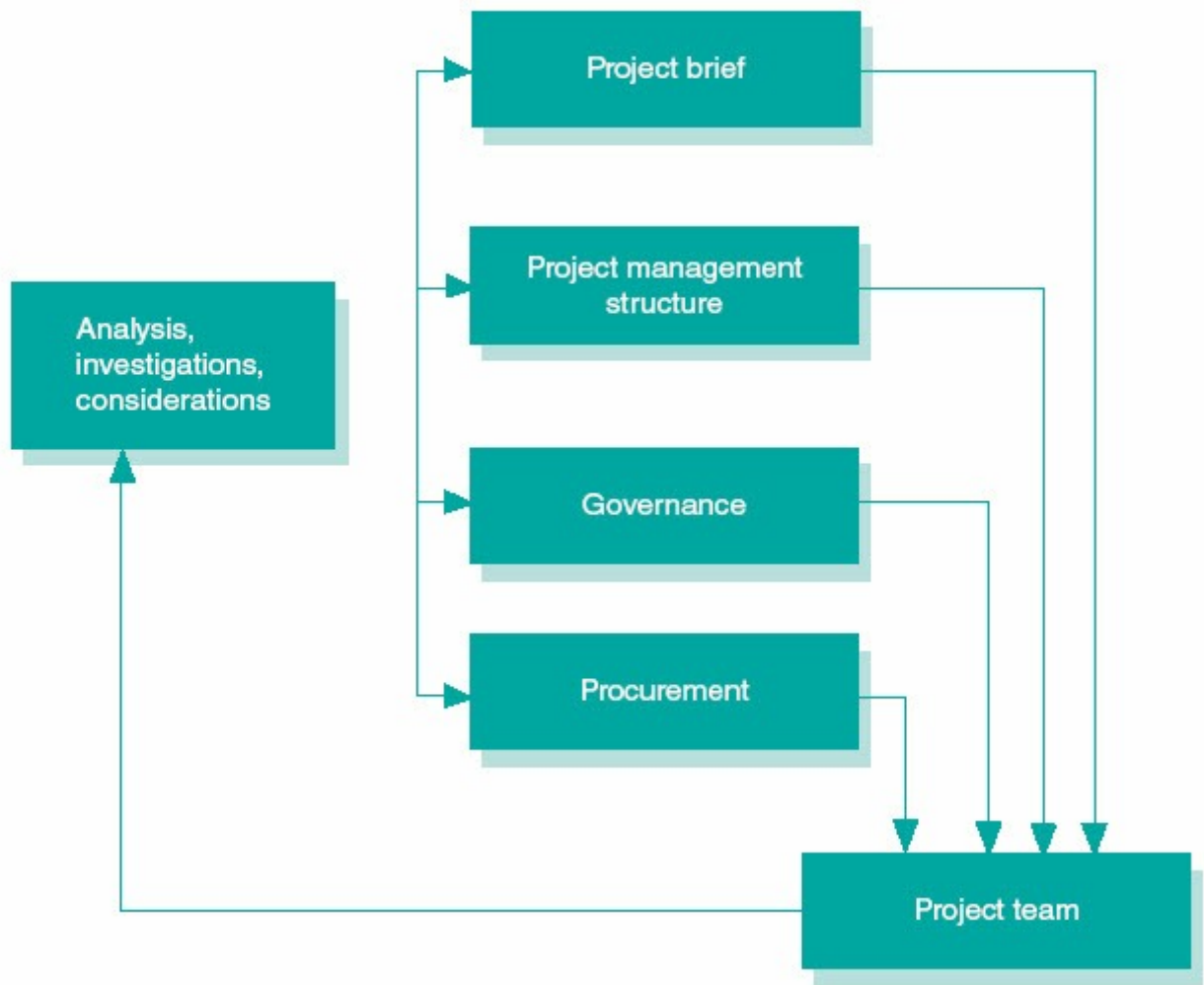


Figure 3.3 Elements of the Strategy Stage

As part of this, establishing investment criteria for environmental measures and including them in value management reviews.

- Establishing that ‘risk and value management’ principles are applied effectively from the earliest stages of the preparation of the design brief until the design is complete. The emphasis should be on providing value for money and in producing a facility that can be constructed and operated at the optimum time and cost without compromising quality, scope or specifications. The design team and consultants should be encouraged to consciously seek to identify the optimum balance of time and cost by better design and construction logistics. An approach where the whole team ‘designs in quality and time-effectiveness and drives out cost’ at all stages in the design process should be encouraged – emphasis on overall value should be encouraged.
- Advising the client on the recruitment and appointment of additional consultants and design team members, that is:
 - preparation of appropriate definition of roles and responsibilities
 - preparation and issue of selection/tender documentation
 - evaluation, reporting and making recommendations

- assisting the client in the preparation of agreements and in selection and appointment
- Drawing the client's attention to the benefits of project insurance for the whole team and works and providing assistance in assessing the risks on the project and including an appropriate contingency sum in the project budget and time contingencies in the master development schedule. Putting in place procedures for managing risk as a continuous project activity.
- Selection, or development, and agreement of the most appropriate form of contract relative to the project objectives and the parameters of cost, time, quality, function and financial viability and risk management.
- Assisting the client in completing site selection/evaluation, investigation and acquisition.
- Advising on whether certain activities, such as fitting out and occupation/migration, constitute separate projects and should be treated as such.
- Making the client aware of relevant statutory submissions and other consultations that may be required in the delivery of the project.

Project organisation and control

A project management organisation structure sets out unambiguously and in detail how the parties to the project are to perform their functions in relation to each other in contributing to the overall scheme. This should be recorded in the *Project Handbook*. It also identifies arrangements and procedures for monitoring and controlling the relevant administrative details. It is updated as circumstances dictate during the lifetime of the project and should allow project objectives and success criteria to be communicated and agreed by all concerned and help promote effective teamwork.

Procedures covering the relationships and arrangements for record keeping, monitoring progress, time and cost control, risk management, project control and administration of the project should be developed, with the assistance of parties involved, for all stages of the project and cover time, costs, quality and reporting/decision-making arrangements. The organisation structure should clearly identify the involvement and obligations of the client and his organisational backup.

Project team structure

Under the overall direction of a project manager, projects are usually carried out by a project team typically comprising the following:

- client' internal team (appropriate representatives)
- project manager (either within the client' own organisation or independently appointed)
- design team: architects, structural/civil/mechanical and electrical (M&E) engineers and technology specialists consultants covering quantity surveying, development surveying, planning and scheduling, legal issues, valuation, finance/leasing, insurances, design audit, sustainability and energy certification, health and safety and environmental protection, access issues, facilities management, highways/traffic planning, construction management, and other specialisms
- contractors, subcontractors and suppliers

The project team structure for project management is shown in Figure 3.2. This structure is idealised and, in practice, there will be many variants depending on the nature of the project, the contractual arrangements, type of project management (external or in-house) involved, and above all, the client's requirements. It should be one of the duties of the project manager to advise the client on the most appropriate project team structure for a particular project.

Effective project management must, at all times, fully embrace all provisions for quality assurance, time and financial control, health and safety, information exchange and environmental protection. These aspects are to be considered as incorporated and implied in all relevant activities presented in this Code of Practice.

Selecting the project team

When establishing a project team, many skills will be needed. During selection, the project manager should consider the following factors:

- A commitment by the project team to clearly defined and measurable project objectives.
- Firm duties of teamwork, with shared financial motivation to pursue those objectives.

These should involve a general presumption to achieve 'in-win' solutions to problems which may arise during the course of the project. Issues such as leadership, communication and teamworking form key cornerstones of a successful project delivery.

The production of satisfactory evidence from each team member, to show that they can contribute effectively to the project objectives. This evidence may include a realistic schedule with appropriate allocation of contingencies against foreseeable risks, a financial plan and a demonstration of adequate resources.

When choosing each team member, as suggested in the Inception stage, special attention to be paid to their:

- relevant experience
- technical qualifications
- appreciation of project objectives
- level of available supporting resources
- creative/innovative ability
- enthusiasm and commitment
- positive team attitude
- communication skills
- Financial strength and core resource strength are also important.
- Defining clear lines of communication between the respective project team members.
- Promoting a working environment that encourages an interchange of ideas by rewarding initiatives which ultimately benefit the project.
- undertaking regular performance appraisals for all project team members.
- Ensuring that project team members are suitably located and that communication
- protocols have been established (particularly for electronic sharing of information) so as to facilitate regular contact with each other, as well as with their own organisations.

- Defining clear areas of responsibility and lines of authority for each project team member, and communicating these within the team.
- Identifying a suitable deputy for each team member, who will be sufficiently familiar with the project to be able to act as their replacement should the need arise.
- Making provision for members of the project team to meet informally and socially, outside the work environment, on a regular basis.

Project management procedures and systems

There are two main elements in the management of construction projects. One is the overall management function, which has much in common with the management of any other kind of organisation. It is concerned with the direction and coordination of the decision-making processes within the project area and its purpose is to get all those involved in the process (the stakeholders including the project team members) to work towards the achievement of the project's objectives. The other element is the management of specialised activities which are peculiar to specific projects. These activities have certain characteristics calling for particular kinds of management skills and styles of operation and it is the responsibility of the project manager to identify these specialised activities and ensure that adequate and appropriate processes and procedures are in place to effect efficient management of these activities. The successful delivery of the project may depend on the project manager identifying and obtaining specialist input at appropriate stages and to the appropriate extent.

Information and communication technology

The construction industry is one of the largest contributors of wealth creation to Europe's business economy, accounting for almost one-tenth of the gross domestic product (GDP) and almost two-thirds of the gross fixed capital formation. The industry is typically extremely information intensive and knowledge based and, therefore, construction organisations in order to be successful and efficient need to fully embrace information and communication technologies (ICT). Although the industry is traditionally renowned for low margins, low levels/barriers to market entry, poor investment in research and development (R&D), etc., ICT has continued to receive significant levels of growth and integration.

The key guidance and information necessary to strategise and formulate ICT relating to governance and management of projects is stated below:

- Business process –Construct IT for Business (www.construct-it.org.uk)
- Interoperability –International Alliance for Interoperability (IAI) Building SMART –K Chapter (www.buildingsmart.org.uk)
- eBusiness –The Network for Construction Collaboration Technology Providers (NCCTP) (Part of Construction Excellence initiatives)
- Electronic Document and Records Management Systems (EDRMS) –information and advice available from Construct IT and the IT Construction Forum of Construction Excellence.
- Electronic Trading –Construction Industry Trading Electronically (CITE) –information available from Construction Excellence website.

- Enterprises Resources Planning (ERP) –ERP traces its roots to the manufacturing sector where Material Requirement Planning (MRP) systems first used computers to automate planning for components. A range of software is available for use in the construction industry.
- Concurrent Engineering –the concept of concurrent engineering originated in the field of product development where multiple functions such as design and manufacturing were integrated to accelerate the delivery of the product.
- Information visualisation –with increased technological advances in computer generated imagery (CGI) technology and assimilation of processes such as Building
- Information Modelling (BIM), information visualisation is being more utilised than perhaps ever before.
- Mobile technology –mobile data management systems are being used to manage several technical functions which include the following:
 - Health and safety
 - Drawing distribution and usage
 - Goods received notes
 - Maintenance and snagging inspections
 - Monitoring hazardous activities
 - Monitoring progress
 - Monitoring resources
 - Quality inspection
 - On-site design issues resolution
 - Site diaries
 - Task allocation and monitoring

In view of the continual growth and popularity of 3D and 4D softwares particularly through BIM, ICT constitutes an important and critical tool in successful development and delivery of construction projects.

Project planning

The project master development schedule should be developed and agreed with the client and the project team, such that it represents the information available at the time for the whole project lifecycle. The master development schedule should include suitable contingencies to reasonably accommodate future developments in the detailed schedules for each of the subsequent stages. These developments typically include reasonably foreseeable scope changes and/or delays to activities as well as an allowance for design/scope evolution.

Increasing levels of detail should be added in a controlled manner – usually before each new stage of the project and as the necessary parameters are established. Care should be taken when administering increasing detail, such that the addition of detail is not confused with changes. Similarly, where increasing detail is added to subsequent phases, the overall period should either fit within the high-level period identified in the master development schedule, or where this is not possible, the master development schedule will require change and hence suitable

administration.

As the project develops, activities which are on the critical path may change; During the early development stage, the critical activities are likely to be ones such as applying for and obtaining statutory approvals, external consultations and enquiries; legal and funding negotiations and any other third-party agreements. It is useful to understand which activities are critical in each phase and to allow a suitable contingency for them.

It is the project manager's responsibility to coordinate the projects' schedules – where more detailed schedules are developed by process owners or specialists; it is similarly the project manager's responsibility to make sure that they are suitably coordinated with the master development schedule. Key coordination activities include making sure that the schedules are developed and issued in a coherent and timely fashion; identification of suitable contingencies to accommodate reasonably foreseeable risks; to monitor, respond to and report on progress as well as to initiate necessary action to rectify potential or actual non-compliance.

Cost planning and controls

A development budget study is undertaken to determine the total costs and returns expected from the project. A cost plan is prepared to include all construction costs and all other items of project cost including professional fees and contingency. All costs included in the cost plan will also be included in the development budget in addition to the developer's returns and other extraneous items such as project insurance, surveys and agent's fees or other specialist advisors. The objective of the cost plan is to allocate the budget to the main elements of the project to provide a basis for cost control. The terms *budget* and *cost plan* are often regarded as synonymous. However, the difference is that the *budget* is the limit of expenditure defined for the project, whereas the *cost plan* is the definition of what the money will be spent on and when. The cost plan should, therefore, include the best possible estimate of the cash flow for the project and should also set targets for the future running costs of the facility. The cost plan should cover all stages of the project and will be the essential reference against which the project costs are managed.

The method used to determine the budget will vary at different stages of the project, although the degree of certainty should increase as more project elements become better defined. The budget should be based on the client's business case and should change only if the business case changes. The aim of cost control is to produce the best possible building within the budget. The cost plan provides the basis for a cash flow plan, based on the master development schedule, allocating expenditure and income to each period of the client's financial year. The expenditures should be given at a stated base-date level and at out-turn levels based on a stated forecast of inflation. A cash flow histogram and cumulative expenditure graph are shown in Figure 3.4.

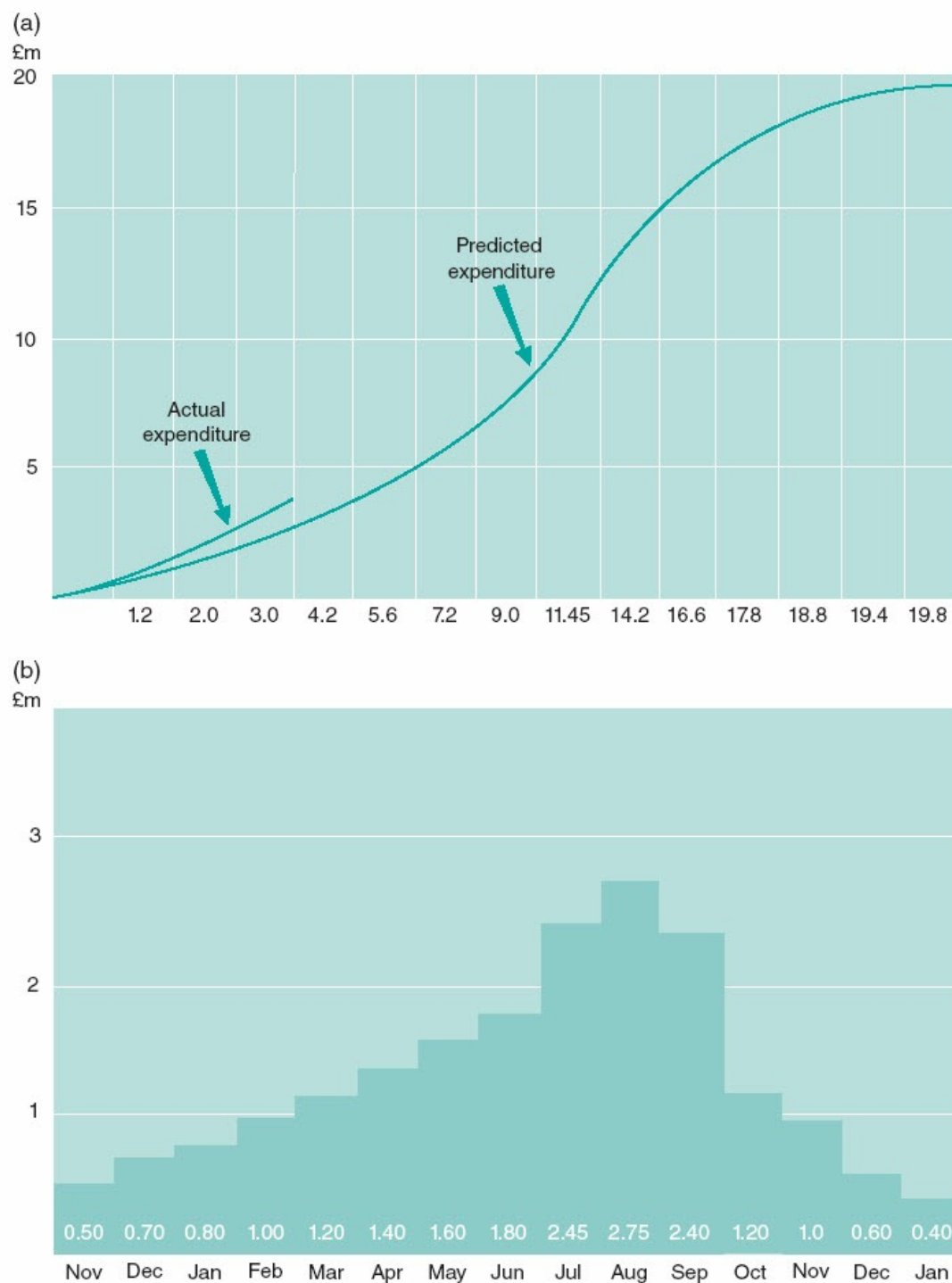


Figure 3.4 Construction expenditure graph & cash flow histogram

Operational cost targets should be established for the various categories of running costs associated with the facility. This should accompany the capital cost plan and be included in the brief to consultants. The importance of revenue, grants and tax planning for capital allowances must also be taken into consideration.

When the cost plan is in place, it serves as the reference point for the monitoring and control of costs throughout a project. The list which follows should be used as an aid in setting up detailed cost-control procedures for all stages of a project.

Cost control

The objective of cost control is to manage the delivery of the project within the approved budget. Regular cost reporting will facilitate, at all times, the best possible estimate of:

- established project cost to date
- anticipated final cost of the project
- future cash flow

In addition, cost reporting may include assessments of:

- ongoing risks to costs
- costs in the use of the completed facility
- potential savings

Monitoring of expenditure to any particular date does not exert any control over future expenditure and, therefore, the final cost of the project. Effective cost control is achieved when the whole of the project team has the correct attitude to cost control, that is, one which will enable fulfilment of the client's objectives.

Effective cost control will require the following actions to be taken:

- Establishing that all decisions taken during design and construction are based on a forecast of the cost implications of the alternatives being considered, and that no decisions are taken whose cost implications would cause the total budget to be exceeded.
- Encouraging the project team to design within the cost plan, at all stages, and adopt the variation/change and design development control procedures for the project. It is generally acknowledged that 80% of cost is determined by design and 20% by construction. It is important that the project team is aware that no member of the team has the authority to increase costs on its section or element of the work.

Savings on another must always balance increased costs on one item.

- Regularly updating and reissuing the cost plan and variation orders causing any alterations to the brief.
- Adjusting the cash flow plan resulting from alterations in the target cost, the master schedule or the forecast of inflation.
- Updating the cost plan in liaison with the project team as design and construction progresses. At all times it should comprise the best possible estimate of the final cost of the project and of the future cash flow. Adherence to design freezes will aid cost control. (Updating also means adding detail as more information about the work is assembled, replacing cost forecasts with more accurate ones or actual costs whenever better information can be obtained.)
- As part of risk management, reviewing contingency and risk allowances at intervals and reporting the assessments is essential. Development of the cost plan should not involve increasing the total cost.
- Checking that the agreed change management process is strictly followed at all stages of the project is very important.

- Arranging that the contractor is given the correct information at the correct time in order to minimise claims. Any anticipated or expected claims should be reported to the client and included in the regular cost reports.
- Contingency money based on a thorough evaluation of the risks is available to pay for events which are unforeseen and unforeseeable. It should not be used to cover changes in the specification or in the client's requirements or for variations resulting from errors or omissions. Should the consultants consider that there is no alternative but to exceed the budget, a written request to the client must be submitted and correct authorisation received. This must include the following:
 - details of variations leading to the request
 - confirmation that the variations are essential
 - confirmation that compensating savings are not possible without having an unacceptable effect on the quality or function of the completed project
 - Submitting regular, up-to-date and accurate cost reports to keep the client well informed of the current budgetary and cost situation.
 - Establishing that all parties are clear about the meaning of each entry in the cost report. No data should be incorrectly entered into the budget report or any incorrect deductions made from them.
 - Ensuring that the project costs are always reported against the original approved budget. Any subsequent variations to the budget must be clearly indicated in the cost reports.
 - Plotting actual expenditure against predicted to give an indication of the project's progress (see Figure 3.4).

Design management process (managing the design delivery)

The design management process includes the management of all project related design activities, people, processes, and resources such as:

- enabling the effective flow and production of design information
- contributing to achieving the successful delivery of the completed project, on time, on budget and in fulfilment of the client's requirements on quality and function in a sustainable manner
- delivering value through integration, planning, coordination, reduction of risk and innovation
- achieving through collaborative and integrated working and value management processes

However, there is much debate over the scope and responsibility for managing the design. This is because while the design team and the DTL (design team leader) are usually ultimately responsible for the production and drawing of the design, ensuring that the drawings are delivered to the project team and the relevant supply chain is usually the responsibility of the DDM (design delivery manager). This process of design delivery is an activity of project management.

Where the project is carried out under a design and build contract, the DDM may be part of the contractor's organisation or the associated design company.

Hand out Date 16/11/16

Hand In Date 30/11/16

NAME

COURSE

Grade

Exercise**1.** What is the key deliverable at Strategy stage?

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2. In a fifteen month contract starting in November, what months are likely to have the highest expenditure?

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3. What are the client's objectives at this stage?

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4. What is the object of cost control?

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5. Name the three participants in a traditional construction coalition project.

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6. Name three processes that Design Management should deliver.

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7. What is the objective of the cost plan?

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8. Mobile data management systems are increasing in use. Name five examples.

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9. The project manager performs several principal activities at the stage. Briefly describe what he/she does to satisfy sustainability.

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10. Draw a diagram showing the elements of the strategy stage.