Office of Government Commerce

The integrated project team
teamworking and partnering

Achieving Excellence in Construction Procurement Guide

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NAO endorsement

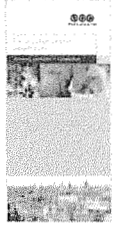
Acknowledgements

The Achieving Excellence Procurement Guides

The *Achieving Excellence* suite of procurement guides replaces the *Construction Procurement Guidance Notes* series.

The new series reflects developments in construction procurement over recent years and builds on government clients' experience of implementing the *Achieving Excellence in Construction* initiative.

High level guides

Core guides



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The best projects and the best clients put time into forming the right team. They assess the quality and experience of the individuals, and their ability to work together as part of an integrated project team; they aim to work as a team from the earliest possible stage.

Introduction

This guide explains how to work together as an integrated project team. The principle is simple: client and suppliers working together as a team can enhance whole-life value while reducing total cost, improve quality, innovate and deliver a project far more effectively than in a traditional fragmented relationship that is often adversarial. Collaborative working should be a core requirement for each element of every project. Putting it into practice through teamworking and partnering requires real commitment from all parties involved, but brings benefits that far outweigh the effort involved.

The guide outlines the principles of successful teamworking and its logical extension, partnering with the supply team. The practicalities of procurement and working together are described in the context of the project lifecycle, together with examples of good practice.

Principles

Definitions

Supply Chain

A supply chain is made up of all the parties responsible for delivering a specific product or service. In the context of construction projects there may be a number of specialised supply chains delivering design services, construction services, manufacturing and assembly of products that are fabricated off-site and so on. Each supply chain member should be accustomed to working together as part of a fully linked chain. Supply chains move from project to project; they are brought together as an integrated supply team to meet a particular business need.

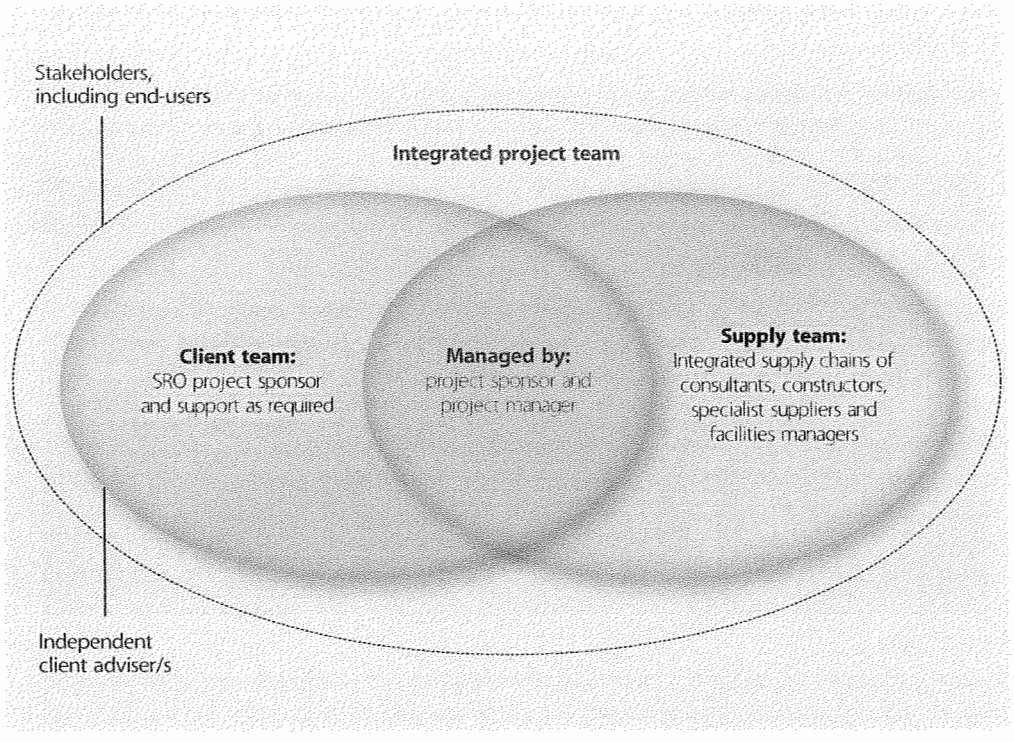
Integrated supply team (IST)

An integrated supply team brings together all the supply chains responsible for delivering the project.

Integrated project team (IPT)

An integrated project team is made up of the client's project team and the supply team of consultants, constructors and specialist suppliers. It brings together the design and construction activities, with maintenance considered as well, whether or not the integrated project team will be responsible for the ongoing maintenance of the facility; it involves valued input from all parties in the supply team. The process and the team are integrated around the construction project.

The integrated project team



Teamworking

Teamworking is characterised by mutual trust and openness, where problems and risks are shared and resolved collectively by the integrated project team – easy in principle, more difficult to achieve in practice, especially where one or more of the parties have not worked in that way before. But teamworking is simply common sense. It is the starting point on which relationships with other parties should be based and applies just as much to the internal relationships between the members of the client's in-house project team as to the working relationships between members of the client organisation and those of the supply team. It does not replace proper and appropriate management structures and procedures. It is a pragmatic way of working together to find ways of delivering the project to the required quality within budget and within the agreed timeframe. It should promote greater openness and encourage earlier involvement by the supply team in the project.

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The teamworking ethic must be demonstrated by senior management, who should act as exemplars of good practice and behaviour, and show commitment to collaboration and partnering throughout the project.

Teambuilding is an essential prerequisite of teamworking. It involves all parties in the team exploring their collective strengths and weaknesses and specific areas of responsibility; agreeing how they will work together in practice; identifying how progress and issues will be reported and resolved and so on. For more information on teambuilding, see the Strategic Forum for Construction's Toolkit (details below); see also Building Down Barriers (*www.mod.uk/NR/rdonlyres/B935410C-ACA9-4F1E-B4BC-FCF91D202B93/0/supplychainhandbook.pdf*).

Teamworking does not develop to its full potential until the parties have been open about their expectations, the objectives of each are truly aligned and there is mutual benefit from the agreed outcome. This is where teamworking moves into partnering.

The Strategic Forum for Construction is developing a toolkit to help clients and individual supply team members assemble integrated teams and promote effective teamworking skills. The toolkit enables the full potential of the teams to be realised for the benefit of the client; it emphasises that supply team integration is also relevant to small and occasional clients as well as to small and medium sized enterprises (SMEs) in the industry and can be applied to most projects.

Partnering

Partnering involves the integrated project team working together to improve performance through agreeing mutual objectives, devising a way for resolving any disputes and committing themselves to continuous improvement, measuring progress and sharing the gains. All the parties have a shared goal of completing the project in a cost-effective and timely way that is mutually beneficial. Partnering can be a 'one-off' for individual projects or a repeat process with the same team for a number of projects:

- **project partnering** involves the integrated supply team and the client organisation working together on a single project, usually following a competitive procurement. Project partnering can achieve savings of 2-10% in the cost of construction
- **strategic partnering** involves the integrated supply team and the client organisation working together on a series of construction projects to promote continuous improvement. Strategic partnering can deliver significant savings, of up to 30% in the cost of construction. With this kind of arrangement a contract or framework agreement is awarded to an integrated supply team for a specified period of time; the team prices individual projects within the contractual arrangement.

Six key principles of partnering are:

- early involvement of key members of the project team
- selection by value, not lowest price
- common processes, such as shared IT
- a commitment to measurement of performance as the basis for continuous improvement
- long-term relationships in the supply chains
- modern commercial arrangements based on target cost or target price with shared pain/gain incentivisation.

Why partnering is worth doing

Long-term collaborative relationships (strategic partnering) can promote better value for money by encouraging clients and suppliers to work together as an integrated project team to:

- improve design, including operational efficiency and health and safety performance
- minimise the need for costly design changes
- identify ways of driving out inefficiency in the construction process
- repeat good practice learned on earlier projects
- minimise the risk of costly disputes
- identify incentives to deliver tangible improvements in the quality of the construction and reductions in time and whole-life cost
- integrate the whole supply chain.

Irrespective of the type of partnering relationship, significant benefits in achieving whole-life value for money can be obtained where a lead supplier has entered into strategic partnering arrangements with its supply chains. Specialist manufacturers and suppliers may be part of joint venture arrangements, a consortium or a teamworking/alliancing agreement. It is important to note that supply chains should also adopt partnering principles. Supply chain relationships of this type are essential to obtain the maximum benefits from partnering for clients and the industry.

When to adopt a partnering approach

Partnering is applicable to all projects, even those that are very straightforward and limited in scope. However, partnering is particularly appropriate when:

- the project is complex and business requirements are difficult to specify
- the client has similar project requirements over time, giving scope for continuous improvements in cost and quality
- construction conditions are uncertain, solutions are difficult to foresee and joint problem-solving is essential.

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Critical success factors

For overall project success there should be:

- a shared risk register, with risks allocated and managed across the team
- clear, measurable targets for health and safety, sustainability, improving value for money in construction quality, delivery times, and whole life costs that are agreed between the client and the other organisations that make up the integrated team
- clear identification of who does what and reporting lines with defined roles and responsibilities for coordinating aspects of the design and construction processes
- performance measurement and benchmarking of both the client and supply team members' performance to promote continuous improvement; the aim is to identify and resolve problems and to share best practice
- target cost arrangements involving the ringfencing of profits, underpinned by open book accounting that makes payment processes visible to all
- arrangements for sharing efficiency gains – so that all parties in the team benefit – and incentives for everyone in the integrated project team to work together to develop innovative, cost-effective design solutions
- clear design quality targets set to promote innovation.

An example of open book accounting is the CITEX project on Defence Estates' North Andover site, where all members of the delivery team draw down their payments from the same bank account on completion of the relevant milestone.

The integrated project team members should organise and integrate their roles and responsibilities to act collaboratively. The team culture is characterised by openness, clearly understood mutual objectives, problem solving, a commitment to continuous improvement (measured against Key Performance Indicators) and mechanisms for managing risks and sharing rewards.

There will need to be clear demonstration that:

- the partnering process has been planned and followed through in a rigorous and clearly documented way
- ongoing value for money is being achieved through the use of Key Performance Indicators, benchmarking and continuous improvement.

The senior responsible owner (SRO), as the project's owner, should be committed to encouraging good teamworking practices. In particular, the SRO should give clear, decisive support where the client enters into partnering or teamworking arrangements with suppliers. Such visible support will include attendance at the initial partnering workshop and commitment to the partnering agreement. For teamworking to succeed, there should be:

- teambuilding workshops led by an independent facilitator (a partnering coach) to help the team to understand and adopt new ways of working
- training and empowering of project staff to work jointly with others as an IPT to identify opportunities to do things more efficiently and to solve problems together

- a commitment by the team to ongoing review and evaluation of performance
- aligned goals (with commitment to those goals)
- post project reviews with the principals of all the parties to identify and disseminate the lessons learned.

Good practice:

- integrate the team so that there is collective responsibility for the whole-life cost and quality implications of their design
- involve the main supply chains in the IPT at an early stage to actively participate in developing the design, to include consideration of the cost of constructing and maintaining the facility, health and safety implications, sustainability, design quality, speed of delivery and the operational efficiency of the completed facility.

Process

This section explains how to bring together and manage an IPT. Details of procurement are covered in *AE6:Procurement and contract strategies*; details of the project process in *AE3:Project procurement lifecycle*; and details of the client roles and responsibilities in *AE2:Project organisation*.

Preparation

Partnering arrangements must have aligned goals and objectives if they are to succeed.

Client objectives should be set before selecting the team. The ideal is to include all of these objectives where they can realistically be achieved:

- commitment to a contract with an integrated team, not with separate companies
- respect for people (health and safety) – zero tolerance of accidents
- an appropriate quality standard based on an output specification
- minimum on-site construction period without compromising quality, increasing cost or adding to risk exposure
- certainty of completion date
- best whole-life value for money
- sustainable solution
- cost certainty
- zero defects.

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Assembling the IPT

The aim is to identify the most appropriate specialists and involve them at key points throughout the project where their expertise can contribute to the design process as well as the construction process. This enables the team to integrate design, fabrication and construction progressively. On most projects substantial design is carried out by specialists concerned with the structure (including ground-type foundations, substructure and superstructure, cladding and piling) and systems (M&E, lifts, testing and commissioning). These specialists should be part of the IPT. Key manufacturers should also be involved.

An integrated team creates the best environment for all who contribute to the design process – consultants, specialists and manufacturers – to generate the design solutions that optimise value for money for the client.

Key criteria for selection of the IST are:

- proven attitude to collaborative working and integrated approach
- proven ability to be proactive
- proven track record in innovation and managing risk.

There should be evidence of:

- senior management commitment to partnering in the team
- staff in the integrated project team with experience in the culture of partnering and teamworking
- commitment to openness and shared accountability
- commitment to collaborative working
- commitment to measure performance against KPIs, where appropriate, to ensure continuous improvement
- proven capability and capacity to deliver the required quality
- ability and commitment to improve quality, deliver on time and reduce whole-life costs through innovation
- commitment to improving health and safety performance
- commitment to design quality
- commitment to sustainability.

Specialist advice

Figure 2 (overleaf) shows the stages at which advice may be required during the life of a construction project. External advice may not be needed where the necessary expertise is already available in-house. The decision on whether to use existing in-house resources, recruit new personnel or use external consultants should be taken on the basis of value for money; it should also take into account team ownership, collaboration, partnering, risk and reward sharing.

Responsibilities will change as the project progresses; responsibilities need to be linked to the risk register, as this shows who is responsible for the management of individual risks.

A **value manager** arranges value management and value engineering studies with key stakeholders at key project stages, to identify opportunities for adding value and reducing waste/inefficiencies. These studies use group decision-making workshops (see *AE4:Risk and value management*) to:

- identify needs and the hierarchy of objectives
- determine preferred options
- ensure that the design and construction approach provides value for money
- learn from best practice (and mistakes) for future projects.

A **risk manager** helps to identify risks and assess their potential impact on the project. Risks are controlled and minimised in accordance with documented risk management plans prepared and regularly updated by the IPT. Risk allowances are set and regularly re-evaluated during project planning and construction stages (see *AE4:Risk and value management*).

Under The Construction (Design and Management) CDM Regulations the client has to appoint a **planning supervisor** on construction projects. A planning supervisor has responsibility for co-ordinating the health and safety aspects of design and for ensuring that a pre-tender health and safety plan is prepared. In particular the planning supervisor's duties include:

- ensuring the HSE is notified of the project
- ensuring co-operation between designers
- ensuring designers comply with their duties
- ensuring a pre-tender stage health and safety plan is prepared
- advising the client when requested to do so
- ensuring a health and safety file is prepared.

For further details see *AE10:Health and Safety*).

2 Stages where advice may be needed

Gate	Project step	Expert advice
	START	
	■ Possible need for project raised ■ Business needs	■ Scope of project ■ Value management (VM)
Gate 0: Startegic assessment		
	■ Options to meet user needs ■ Business case (SOC)	■ VM, risk management (RM) ■ Estimates (whole-life costs); investment appraisal
Gate 1: Business justification		
	■ Project brief ■ Carry out feasibility study ■ Procurement route; OBC ■ Output specification	■ Development of project brief ■ VM, RM; estimates ■ Procurement approach ■ RM, VM
Gate 2: Procurement strategy		
	■ Draft contracts* ■ Tendering process; FBC	■ Contract preparation, including incentives ■ Selection and evaluation
Gate 3: Investment decision		
	■ Contract award* and formation of IPT ■ Outline design	■ Partnering facilitation ■ Design development, Value engineering (VE)
Decision point 1: Outline design		
	■ Detailed design	■ VE RM
Decision point 2: Detailed design		
	■ Construction	■ VE RM
Gate 4: Readiness for service		
	■ Facility in use	■ Post project review (PPR) ■ Post implementation review (PIR)
Gate 5: Benefits evaluation		
	■ Disposal	
	End	*Procurement of new IST or agree terms under existing framework arrangement

Design consultants include architects, civil engineers, structural engineers, electrical engineers, mechanical engineers, public health engineers, urban designers, landscape designers and interior designers. They may be involved in preparing outline designs for feasibility studies, design exemplars and/or detailed design as part of the IPT.

Other specialist consultants include a variety of experts such as specialist facility and equipment designers, environmental consultants and design consultants advising on specialist aspects. For example, environmental consultants may advise on the environmental advantages and disadvantages of each of the scheme options, prepare environmental statements and design environmental mitigation measures.

Cost consultants provide advice on whole-life costing, estimate preparation, risk quantification, cost planning, cost monitoring and reporting and advice on budget costing, maximum price, pain/gain share mechanisms, open book accounting and other cost models. (See *AE7:Whole-life costing and cost management*).

The **contract administrator** administers the main construction contract. The title of this role and the precise level of responsibility will depend on the form of contract adopted.

A partnering facilitator assists the parties entering into a partnering arrangement to identify common goals, agree performance measures and dispute resolution mechanisms. These are drawn up and embodied in a partnering charter. The facilitator should be independent of the project team.

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Clients should:

- seek long-term collaborative relationships with ISTs within the policy and legal framework for public procurement. The benefits include client and suppliers working together to improve design, health and safety, and sustainablity performance, minimise the need for costly design changes, identify ways of driving out inefficiency in the construction process, repeat good practice learned on earlier projects and minimise the risk of costly disputes
- enable the IPT to contribute more fully to the design of a quality scheme, including buildability. Their ability to do so should not be unduly constrained by the timing of their involvement, over-prescriptive specifications or inadequate incentives to encourage innovation
- ensure that primary suppliers involve their supply chains fully as members of the IPT
- seek optimum rather than maximum risk transfer, with risks allocated to the parties in the IPT best able to manage them
- use appropriate procurement routes, and build in target prices with pain/gain share mechanisms to provide incentives for integrated project teams
- involve ISTs early where Design & Build is the selected route, requiring them to tender for a two-stage contract: the first stage of which is to steer the project through the statutory process (such as planning permission) and develop a full working design; the second stage is the construction of the scheme (an example is Highways Agency's Early Contractor Involvement initiative)
- consider framework agreements that provide opportunities to increase the client's knowledge of the IST and to provide the project team with an incentive to improve performance
- ask tenderers to provide information on their health and safety procedures on site and how they will record accidents or near-misses (see *AE10:Health and safety*)
- encourage smaller suppliers to become part of a supply chain.

Partnering arrangements should be adopted as far as possible on all new and existing contracts. Where applicable, the client should inform potential suppliers of its intention to adopt a partnering approach early in the procurement. Partnering arrangements, whether project specific or longer-term strategic partnering, do not replace the need for competition at the outset of the contract. Partnering is acceptable under EU rules if:

- it is competitively arranged
- the client's needs and objectives are clearly stated in the OJEU advertisement
- the contract is for a specified period.

There is scope for more long-term relationships, as long as the initial competition conforms to EU Procurement Rules and with the requirements of propriety and accountability. Framework agreements are appropriate where there is a need to regularly procure the services of suppliers. These arrangements should contain performance-related clauses.

The IST should be remunerated in a way that gives them shared incentives to deliver good-quality construction to budget and on time. At the same time, clients need to be confident that value for money is being achieved. See *AE6:Procurement and contract strategies* for details of appropriate payment mechanisms.

Appropriate incentives should be included in contracts or in partnering arrangements, to encourage the IST to provide additional benefits to the client that will be of value (such as using innovation or different working practices to deliver the same or better service while achieving cost savings). Target cost arrangements will often provide the appropriate incentive within partnering arrangements, provided profits are ringfenced and the emphasis is on minimising waste and taking innovative approaches to reduce costs while still meeting clients' needs.

Contract award: the contract is awarded to the team offering best value for money (a combination of whole-life cost and quality to meet the user's requirement). At this stage the contractual basis is confirmed, which covers the whole process of design development, supply chain relationships, performance improvement and pricing structures. Partnering charters (see below) are a non-binding way of agreeing the working relationship. However, partnering built into a formal contract may provide a firmer foundation. It builds on the principles of those charters to place the relationships on a firm footing from the start of the project. The contract should support the whole team and aim to deliver an integrated project process. It should set out the agreed accountability for each party, the goals and how they will be achieved, the processes for managing risk and sharing rewards, and the guidelines for managing disputes and resolving problems. (See *AE6:Procurement and contract strategies*.)

Teamworking and partnering workshops

Workshops should be held at the start of the project and at appropriate stages throughout the project to:

- facilitate teambuilding
- clarify the aims and objectives of the parties
- agree joint objectives for the project
- develop processes and procedures for communications and problem resolution
- produce a partnering charter for the project.

Senior managers from each organisation should be involved in the initial workshop to ensure visible high level commitment. Further workshops are held throughout the project lifecycle as required to ensure the teamworking and partnering ethos is being maintained.

The partnering facilitator is a key role in helping the IPT determine exactly how they will work together. The partnering facilitator is independent of the team and can give impartial advice on the strengths and weaknesses of team members and the team as a whole.

There are a number of practical tools for teambuilding and greater collaboration at project level.

Partnering charters

Partnering charters supplement the contract. They are not usually legally binding but are valuable tools because they can be used to:

- identify the common goals for success
- set out a common resolution process for reaching decisions and solving problems
- identify the targets that provide continuous measurable improvements in performance
- set out gain-share and pain-share arrangements (incentives) where these are not included within the formal contract.

The partnering charter is signed by all of the individuals in the partnering arrangement. It should contain an express provision making it clear that the charter is not intended to be legally enforceable. The charter normally includes a statement to the effect that the arrangement only remains operative as long as all parties to it wish it to remain in place. A partnering charter developed and agreed by all the parties is likely to be appropriate to the specific circumstances and drawn up in a form that the parties to it are happy to sign up to. The alternative of adopting 'off the peg' partnering charters to fit over the formal contract in a prescriptive manner is less likely to result in success.

Dispute resolution

The dispute resolution process should require problems to be resolved and decisions reached by individuals at the lowest possible level within the IPT.

It should set a time period by which a decision must be reached at that level before the issue is moved up to individuals at the next level in the respective organisations and so on up to the most senior levels. The recommended approach is to adopt alternative dispute resolution (ADR); Alternative Dispute Resolution can be found at www.ogc.gov.uk//documents/cp0077.pdf.

Practical considerations

Partnering workshops should be undertaken through the life of the project, typically at these stages:

- design and pre-construction: to identify individual and collective objectives, agree roles and responsibilities, set measurement/targets, define accountabilities, determine how cost savings will be shared, and produce an action plan
- construction period: series of workshops as required to review action plans and revisit objectives
- post-construction period: debrief workshop at the end of the project to review success and learn lessons from experience.

Strategic partnering arrangements should be checked from time to time to ensure that they continue to provide value for money. Such checks might include:

- comparison of performance against other contracts (total value for money of outputs and not just initial tender price)
- clear demonstration of a regular increase in value for money from the start of the contract through continuous improvement.

Partnering offers good potential to improve the value for money of construction. For a partnering arrangement to be successful, all parties – clients and the whole supply team – must be fully committed to making the relationship work. There should be continuous and reliable monitoring of performance to ensure that the arrangement is achieving what it was set up to do and that public sector propriety is not compromised.

Clear records must be maintained by the IPT to demonstrate how the parties have worked together to reach decisions, how best value has accrued to the client and that probity and propriety have been maintained. It is essential to be able to demonstrate proper accountability.

Integrated teams enable risk management issues (including project insurance) to be fully addressed by the whole team in an open and transparent way. Project insurance should be considered to facilitate integrated working.

Case Study

Establishing longer-term relationships – the Highways Agency road maintenance contracts

The Highways Agency had delivered its routine and winter maintenance service and small scale projects (under £100,000) through 24 maintenance areas. In each area the Agency had Managing Agent (MA) contracts to design, plan, programme, manage and oversee all maintenance and low value projects and a Term Maintenance Contractor (TMC) contract to carry out the actual works. These contracts ran for three years with options to extend by two years or one respectively. Whilst this was a significant improvement on the previous 92 local authority-maintained areas, the Agency recognised that there was still scope for greater improvements through developing long-term collaborative and integrated working relationships.

The Agency developed two main proposals: to improve the existing MA and TMC forms of contract with enhanced partnering arrangements, and to merge the roles of the MA and TMC to create a totally integrated (one entity) service delivery team with greater scope for innovation to deliver best value, known as the Managing Agent Contractor (MAC).

The Agency has now completed its main round of renewing the old contracts and reduced the number of areas down to just 14, to allow for de-trunking and create a critical mass of activity in each area. This has resulted in the appointment of 8 MAC suppliers and 6 MA and TMC suppliers in the 14 areas. Initial indications suggest that the integrated suppliers approach is giving significantly improved value for money compared to previous arrangements. In addition, the Agency is also seeing benefits from the integrated teams in terms of innovation and customer service. Because the relationships are designed to deliver continual improvements, the Highways Agency expects to see even further benefits from working this way, such as better predictability of project delivery times and better overall customer service.

Case Study

Integrating the supply chain – the Ministry of Defence construction contracts (Building Down Barriers)

The Ministry of Defence is using Prime Contracting as its preferred procurement route where the Private Finance Initiative is not appropriate. The Prime Contractor will be expected to have a well-established supply chain, and to integrate that supply chain into the design process, and coordinate and project manage all their activities throughout the design and construction period. Two types of Prime Contract are being used:

- capital works for large and complex projects, with the contractor designing and constructing the building and maintaining it for at least three years to prove its through-life cost predictions
- One Stop Shops where one Prime Contractor will deliver all property maintenance and capital works for all three armed services in a region. One Stop Shop contracts will run for five to seven years with an option to extend to ten years.

Where Prime Contracting is used they expect to achieve value for money improvements of 30% in the cost of construction and in their operational running costs by 2005.

[Source: NAO]

Good practice: Building Down Barriers

MOD's Defence Estates' initiative Building Down Barriers at *www.mod.uk/NR/rdonlyres/B935410C-ACA9-4F1E-B4BC-FCF91D202B93/0/supplychainhandbook.pdf* identifies seven key principles for Prime Contractors:

- compete through offering superior underlying value rather than lower margins
- establish long-term relations with key suppliers
- manage the supply chain throughout a project with supply clusters (that is, bringing together groups of suppliers to design and deliver an integrated part or element of a facility by working together as a 'cluster')
- make value explicit: design to meet a functional requirement for a whole-life cost (that is, including maintenance – not just capital cost of construction)
- involve the supply chain in design and cost development – using target costing, value management and risk management
- develop continuous improvement within the supply chain
- promote collaboration through leadership, facilitation, training and incentives.

Further information

- Strategic Forum for Construction Toolkit: *www.strategicforum.org.uk/sfctoolkit2/home/home.html*
- *Partnering in the Team*, Construction Industry Board (ISBN 0 7277 2551 3)
- *Partnering in the Public Sector: a toolkit for the implementation of post award, project specific partnering on construction projects*, European Construction Institute (ISBN 1 873844 34 4)
- *Constructing Improvement: the clients' pact with the industry*, Construction Clients' Forum
- *The Seven Pillars of Partnering*, Reading Construction Forum (ISBN 072772690 0)
- *Trusting the Team*, Reading Construction Forum (ISBN 0 7049 0503 5)
- *Partnering Arrangements between the Ministry of Defence and its suppliers: a practical guide to creation agreement management*, Ministry of Defence (e-mail DGCommercial@dawn.pe.mod.uk)
- Partnering toolkit, Building Services Resesarch and Information Association (*see BSRIA website at www.bsria.co.uk*)

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Office of Government Commerce, Trevelyan House, 26 - 30 Great Peter Street, London SW1P 2BY
Service Desk: (0845) 000 4999 | E: ServiceDesk@ogc.gsi.gov.uk | W: www.ogc.gov.uk

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Procurement and contract strategies

Achieving Excellence in Construction Procurement Guide

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Contents

The Achieving Excellence Procurement Guides

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The new series reflects developments in construction procurement over recent years and builds on government clients' experience of implementing the *Achieving Excellence in Construction* initiative.

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06 Procurement and contract strategies

The primary consideration in the procurement of construction projects is the need to obtain best value for money in the whole life of the service or facility. The design and operation of the facility should maximise the delivery of effective public services; this is most likely to be achieved through integration of the design, construction, operation and ongoing maintenance.

Introduction

This guide explains how to determine appropriate procurement routes that will deliver best value for money. Design, construction, operation and maintenance should not be considered in isolation from each other. The recommended procurement routes allow designers, constructors and specialist suppliers to work together in an integrated team.

Principles

Procurement decisions about construction projects should always be on the basis of value for money over the life of the facility and not on the initial capital cost alone. OGC's Best Practice briefing: *Value for money evaluations in complex procurements* explains how to take account of all the factors when making an investment decision; all central government departments have to demonstrate their compliance with this best practice.

Definitions

Value for money: this is the optimum combination of whole-life costs and quality to meet the user requirement.

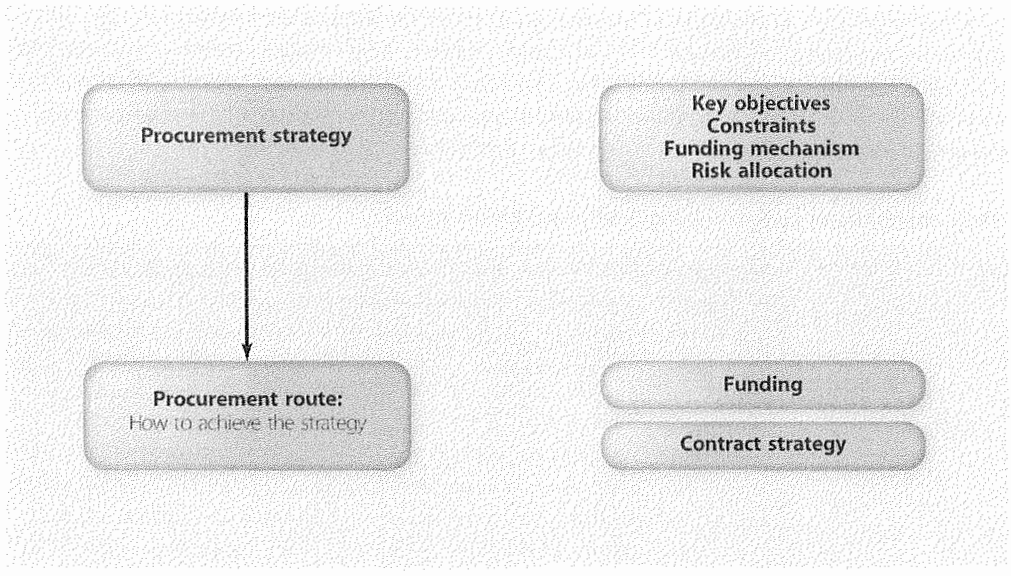
Procurement strategy: the procurement strategy identifies the best way of achieving the objectives of the project and value for money, taking account of the risks and constraints, leading to decisions about the funding mechanism and asset ownership for the project. The aim of a procurement strategy is to achieve the optimum balance of risk, control and funding for a particular project.

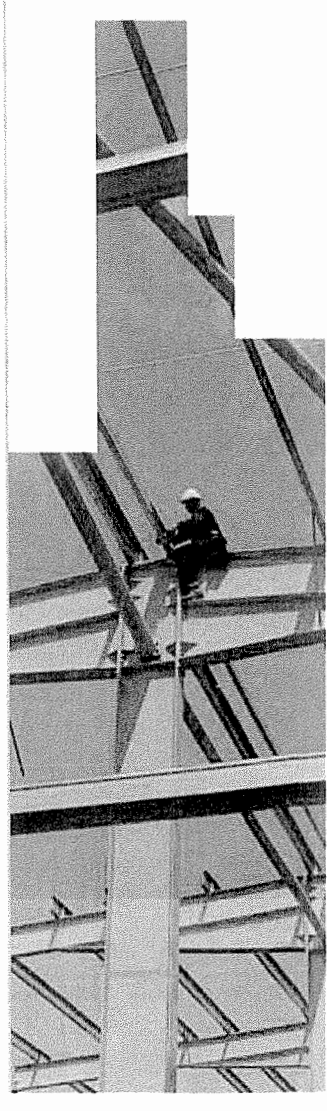
Procurement route: the procurement route delivers the procurement strategy. It includes the contract strategy that will best meet the client's needs. An integrated procurement route ensures that design, construction, operation and maintenance are considered as a whole; it also ensures that the delivery team work together as an integrated project team.

Contract strategy: the contract strategy determines the level of integration of design, construction and ongoing maintenance for a given project, and should support the main project objectives in terms of risk allocation, delivery, incentivisation and so on. There are a number of different contract strategies; the recommended strategies to meet *Achieving Excellence* principles of integration are outlined in this guide.

Figure 1 shows the relationship between the procurement strategy, procurement route and contract strategy. The procurement strategy determines the most appropriate procurement route, including the contract strategy, to fit the project objectives and current circumstances. For every construction project the client should consider the design, construction, operation and maintenance of the facility as a whole, together with how the project will be funded. An integrated procurement route should be adopted to deliver the project, where all of these aspects have been considered together.

Procurement strategy and procurement route





Preferred integrated procurement routes

Since April 2000, government policy has been that projects should be procured by one of the three recommended procurement routes (PFI, Prime Contracting or Design & Build). Before concluding the preferred integrated procurement route, Departments should consider the HMT report *PFI: Meeting the Investment Challenge*. This suggests that construction projects whose capital cost does not exceed £20m are not likely to achieve value for money under the PFI route. Traditional procurement routes should only be used if they demonstrably add value in comparison to the three recommended routes. Assessing value for money is a central process in procurement. For PFI projects the Government will institute a new assessment of the potential value for money of procurement options when overall investment decisions are made; reform the Public Sector Comparator (PSC) (alternative route may still be chosen); and set up a final assessment of competitive interest in a project.

The new *Achieving Excellence* targets, agreed by Ministers in December 2002, require projects to demonstrate a significant improvement in performance against quality, cost and time targets. In order to achieve these, it is essential that all procuring bodies move towards proper integration of the design, construction and operation functions. This will require a move to fully integrated teams, early supply team involvement, incentivised payment mechanisms, continuous improvement processes and joint commitment to achieving best whole-life value. These requirements are applicable whichever of the three preferred procurement routes is selected. Framework arrangements may also add value.

2 OGC definitions of preferred integrated procurement routes

PFI	Where the public sector contracts to purchase quality services, with defined outputs from the private sector on long-term basis, and including maintaining or constructing the necessary infrastructure so as to take advantage of private management skills incentivised by having private finance at risk.
Prime Contracting	Using a single contractor to act as the sole point of responsibility to a public sector client for the management and delivery of a construction project on time, within budget (defined over the lifetime of the project) and fit for the purpose for which it was intended, including demonstrating during the initial period of operation that operating cost and performance parameters can be met in accordance with a pre-agreed cost model.
Design & Build	Using a single contractor to act as the sole point of responsibility to a public sector client for the design, management and delivery of a construction project on time, within budget (taking account of whole-life costs) and in accordance with a pre-defined output specification using reasonable skill and care.

An integrated project team should be appointed to carry out the project. However, the procurement strategy may indicate that separate contracts for part of the project are appropriate to meet specific objectives (for example, the NHS has developed standard designs to be incorporated in their facilities, which are constructed to the standard specification by different suppliers). The important point to note is that the project is considered as a whole, regardless of whether it is delivered through a single contract or through several related contracts.

Traditional contract strategies, where the design and construction are provided separately, should only be used where it can be clearly demonstrated that this approach will provide better value for money than the preferred integrated procurement routes highlighted above. In a traditional contract, the design is undertaken by a team separately appointed by the client, with construction by a contractor competitively appointed on the basis of a detailed specification prepared by the client's consultants.

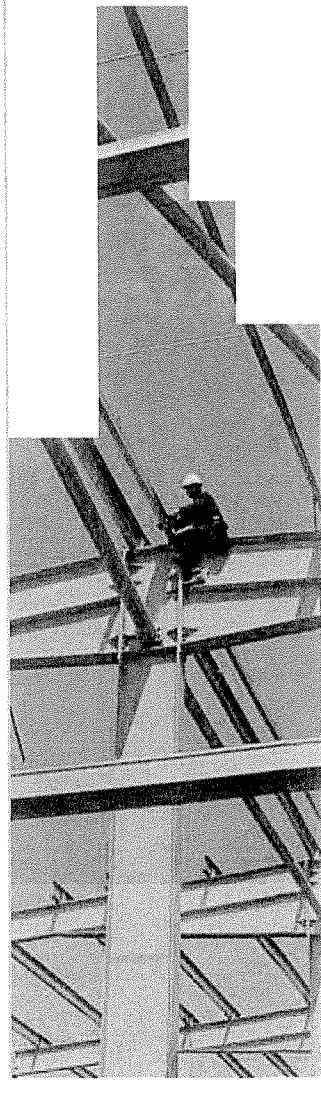
What clients need to be able to do:

- be able to define clearly what they want
- be aware of the market and negotiate deals that are justified on whole-life value
- know how the industry works, collecting market intelligence and regularly carrying out market research
- know the major players, establish who regularly works well with whom and get to know the specialist suppliers
- develop more effective arrangements to build up and share knowledge about the performance of particular suppliers and the construction market generally, so that decisions about the appointment of suppliers are better informed.

Process

This section describes the practicalities of the procurement process. It explains the steps to take in determining the procurement route and outlines the main points to consider before procuring the construction project.

Figure 3 summarises the procurement process and shows OGC's Gateway review stages (described in more detail below). For details of the procurement process in general terms, see the introduction to procurement on the OGC Website at *www.ogc.gov.uk/introduction_to_procurement.asp*



The factors that influence the procurement strategy should be considered:

- the project objectives – for example, to provide office space for *x* people to deliver a specific service
- constraints – such as budget and funding; the timeframe in which the facility is to be delivered; exit strategy
- cultural factors – such as considerations about the workspace environment that will best support the way people work
- risks – such as late completion of the facility; innovative use of materials
- the client's capabilities to manage a project of this type
- the length of operational service required from the facility.

3 Procurement process

Procurement Stage	Gateway review	Key procurement tasks up to each Gate
Establish business need	Gate 0: Strategic assessment	Identify high-level options for meeting the business need
Develop business case	Gate 1: Business justification	Produce high-level business case (Strategic Outline Case) and detailed options appraisal
Develop procurement strategy	Gate 2: Procurement strategy	Produce Outline Business Case; determine procurement route (including contract strategy); produce output-based specification and criteria for selection and award; OJEU advertisement if required
Competitive procurement	Gate 3: Investment decision	Competitive tendering (where there is no existing arrangement with a supply team) leading to contract award for integrated supply team; Full business Case
Award and implement contract; outline design	Decision point 1: Outline design	Following approval of outline design, proceed to detailed design
Detailed design	Decision point 2: Detailed design	Following approval of detailed design, proceed to construction
Take delivery of facility; settle final accounts/start unitary payments (PFI)	Gate 4: Readiness for service	Commissioning of facility; handover to contract management where applicable
Manage contract for services, where applicable	Gate 5: Benefits evaluation	Post implementation review, to confirm achievement of business benefits as the justification for investment in the facility

Some compromises may have to be made to arrive at the optimum way forward, in order to achieve the optimum balance of risk, benefit and funding for a particular project.

Case Study

The Environment Agency

The Environment Agency's procurement strategy for engineering works has the following aims:

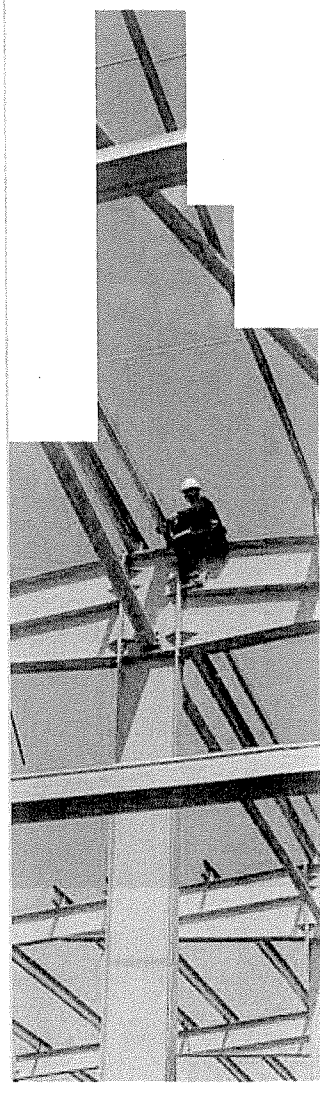
- to deliver best value for money to the Agency
- to be at the leading edge of technology, innovation and business best practice
- to champion environmental best practice.

The Agency has increased the value of its projects by combining similar projects or work within a region. It has also reduced the number of consultancy suppliers from forty-six to four.

It has a national team responsible for the procurement and project management of capital projects to deliver new ways of working and to provide consistency in processes and relationships with suppliers.

Suppliers should be better informed about the Agency's needs. Projects will be of higher value and for longer periods. This will allow suppliers to learn from one part of the work to the next and to agree targets for improvements to both cost and quality. Suppliers should make higher margins and cover both fair profits and overheads. They will have greater certainty of work, enabling them to invest some of the profits in development work.

Fewer suppliers will be used, who will be able to develop a better understanding of the Agency's needs and to respond with more innovative solutions to those needs. Suppliers will receive a more consistent approach from a better informed and trained client. Suppliers' profitability on Agency work is now also linked to the achievement of the Agency's target.

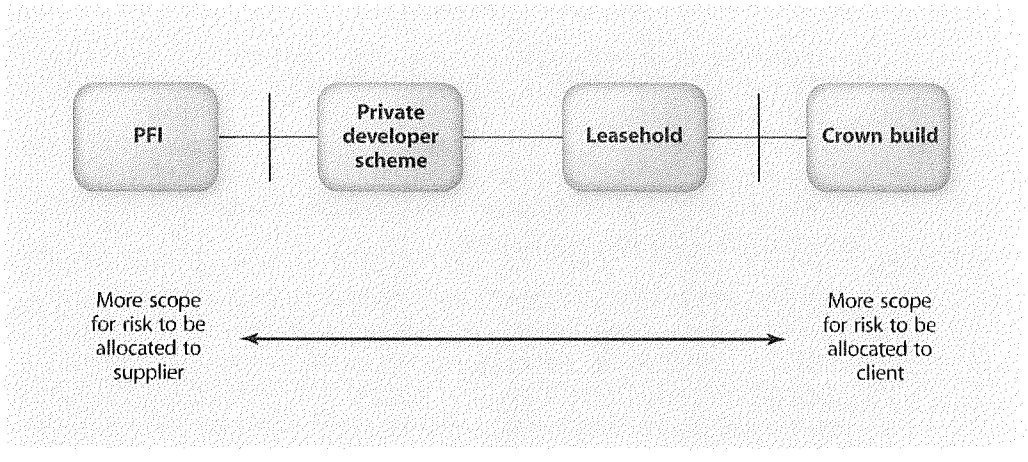


Level of risk transfer and funding arrangement

Decide on the optimum allocation of risk associated with the project and how the project will be procured, in order to achieve the optimum allocation of project risks. These need to be identified and considered with the most suitable procurement strategy. At one extreme, there is more scope to allocate risk to a provider of a managed service with the Private Finance Initiative. At the other extreme, there is more scope to allocate risk to the client who maintains ownership of a capital asset and upfront capital payment for construction (Crown build); see Figure 4. The Government's approach to risk in PFI projects does not seek to transfer risks to the private sector as an end in itself. Where risks are transferred, it is to create the correct disciplines and incentives on the private sector to achieve a better outcome. The options depend on the project objectives.

For example, there may be a requirement to accommodate staff delivering a particular service over a long period of time where there are unlikely to be fluctuating demands for office space, where a managed service would meet the business need. Alternatively, there might be a short-term requirement to accommodate the same staff, where the business need is known to change in the near future – in this case, the need could be met by leasing or refurbishing for a short period. In addition, funding may or may not be available for a construction project. Contract strategies will also encompass a range of degree of risk transfer as shown in Figure 5.

Level of risk transfer and funding arrangement

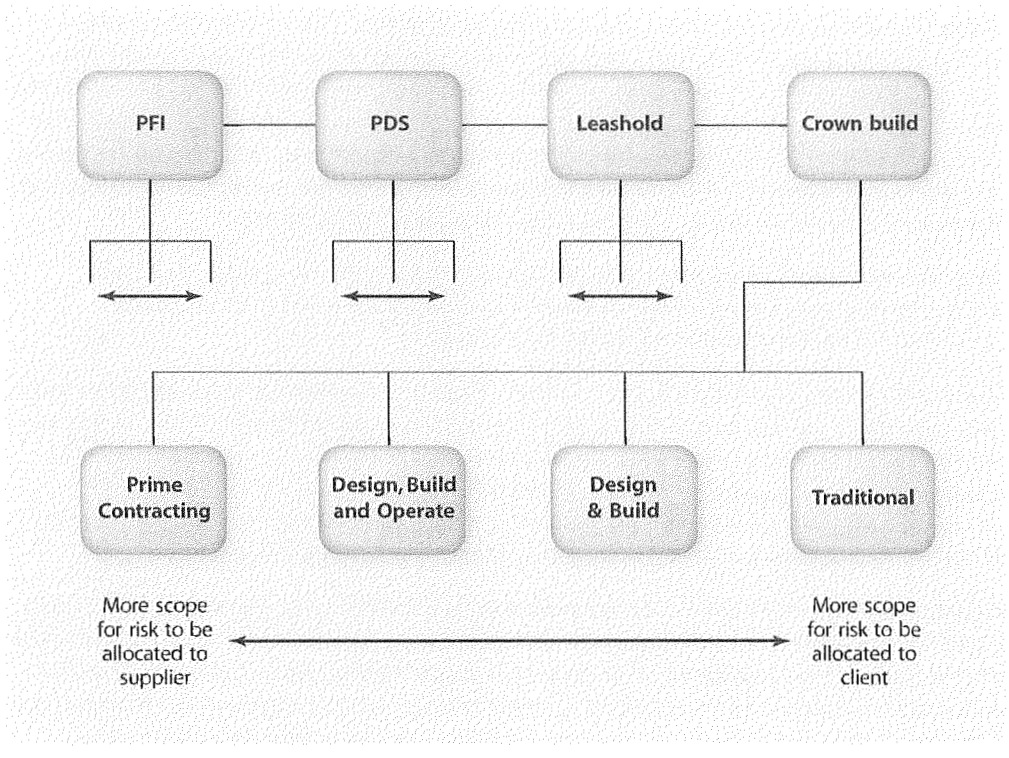


Funding options include:

- **PFI:** construction projects are undertaken by the private sector, who are incentivised by having private finance at risk, and have asset ownership for the duration of the contract; ongoing maintenance and operation are also provided by the private sector in PFI arrangements, with government (revenue budget) or users charged for the service provision. PFI is explored in detail in *PFI: Meeting the investment challenge*.
- **Private Developer Scheme (PDS):** typically this may be a construction project undertaken and funded by a developer for the provision of workspace for government occupation, with government recharged on a rental basis as a function of the capital cost of the works and land. PDS is a preletting/purchase of space that would not otherwise be constructed in the absence of a forward commitment to lease or purchase. Funding is usually from the developer and the rental is a function of the total development costs. EU Procurement Rules may apply to such procurements, depending on a combination of the value of the works and the extent of client specification. Clients should seek advice from their organisation's procurement experts in respect of their specific circumstances, especially if they are unclear as to whether or not the EU rules apply

- **Leasehold:** in this arrangement the client occupies a facility under a lease but does not own it. Construction projects might include refurbishment or fit-out, funded directly by the client via capital expenditure budget
- **Crown build:** these are new build or refurbishment construction projects funded directly by the client via capital expenditure budget, with asset ownership (freehold) remaining with the client.

5 Level of risk transfer and contract strategy



Determining the contract strategy

This section describes the contract strategies that could be used to achieve the objectives of the procurement strategy; see also Annex A for a summary table.

Private Finance Initiative (PFI): only recommended for projects whose capital cost is likely to exceed £20m, are created for the provision of services and not for the exclusive provision of capital assets such as buildings. For this reason it is preferable to investigate PFI as soon as possible after a user need has been identified rather than leaving it until a conventional construction project has been selected as the solution. It is possible that a PFI project may result in a solution (provision of services to meet the user need) that does not require a construction project. Additional guidance is available from the HM Treasury PFI Unit.

Design & Build: in a Design & Build contract, the integrated project team is responsible for both the design and construction of the facility. The supply team is likely to deliver the greatest performance benefits to the client through innovation, standardisation and integrated supply chains, where appropriate output specifications are used. These specifications focus on what the completed facility enables the client to do (for example, to provide a standard office environment for fifty staff). They do not specify the detail (number of doors and windows etc) except where there are specialised requirements, because the supplier will be better placed to decide on how the requirement will be met.

Where an output specification is not well developed, there is a risk that the quality, design and performance of the completed facility may be compromised. Careful attention to the output specification is essential to achieve the required outcome.

There may be some circumstances where the Design & Build procurement option should be extended to cover maintenance and also possibly operation of the facility for a substantial period. By including the maintenance and operation requirements within a design and construction contract, the supplier has increased incentive for adopting innovative solutions that provide greater value for money when considering whole-life costs. Departmental Private Finance Units and HM Treasury's Private Finance Unit should be able to provide advice on how best to consider maintenance and operation.

Prime Contracting: Prime Contracting requires there to be a single point of responsibility (the Prime Contractor) between the client and the supply team. The Prime Contractor needs to be an organisation with the ability to bring together all of the parties (the supply team) necessary to meet the client's requirements effectively. There is nothing to prevent a designer, facilities manager, financier or any other organisation from acting as the Prime Contractor, providing they have suitable ability and experience. Prime Contracting must demonstrate during the initial occupation period that operating cost and performance parameters can be met. It usually includes such features as pain/gain share (where the Prime Contractor as well as the client gains financially by reducing the project costs), target cost pricing (where prices are agreed on the basis of a reasonable profit for the supply team and value for money to the client) and open book accounting (where costs are made transparent to the client).

As part of the selection process, clients should request details of the parties likely to be in the supply team. A significant number of the other organisations that make up the supply team should be made known and taken into account during the technical capacity assessment. At selection interviews, the client should expect to meet representatives from all the main companies in the supply team.

Questions to ask about the contract strategy:

- What resources and expertise does the client have?
- What influence/control does the client need to exert over the design?
- Who is best able to carry out the design?
- What influences/controls does the client wish to exert over the management of:
  - planning (project, construction)?
  - interfaces (project, end-users)?
  - risk?
  - design?
  - construction?
- What can the market provide and what framework agreements are already in place?

Checklist: procurement route and contract

Accessing the procurement route:

- is this the right procurement route for the project, backed up with a contract in which roles and responsibilities are clearly defined and risks are appropriately allocated?
- are choices about allocating risk and control tailored to the circumstances of the project and reflected in the procurement strategy?
- has the most appropriate integrated procurement route been chosen – PFI, Design & Build or Prime Contracting?

Assessing the contract:

- have improvement targets and measurement arrangements been agreed with the integrated project team and quantified?
- have incentives been included in the contract to encourage the integrated project team to perform well and achieve the client's objectives?
- have the required benefits been quantified before incentive payments will be paid?

Further information

- *Guide to the appointment of consultants and contractors (GACC)*, OGC's Property and Construction Directorate
- *Selecting consultants for the team: balancing quality and price*, Construction Industry Board (ISBN 0 7277 2543 2)
- *Code of practice for the selection of main contractors*, Construction Industry Board (ISBN 0 7277 2618 8)
- *Briefing the team*, Construction Industry Board (ISBN 0 7277 2540 8)
- *Value by competition: a guide to the competitive procurement of consultancy services for construction*, CIRIA special publication 117 (ISBN 0 86017 414 X)
- *PFI: meeting the investment challenge, www.hm-treasury.gov.uk/media/648B2/PFI_604.pdf*

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Office of Government Commerce, Trevelyan House, 28 - 30 Great Peter Street, London SW1P 2BY
Service Desk: 0845 000 4999 · **E:** ServiceDesk@ogc.gsi.gov.uk · **W:** www.ogc.gov.uk

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Whole-life costing and cost management

Achieving Excellence in Construction Procurement Guide

07

Contents

NAO endorsement

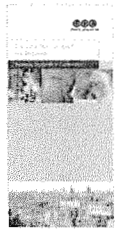
Acknowledgements

The Achieving Excellence Procurement Guides

The *Achieving Excellence* suite of procurement guides replaces the *Construction Procurement Guidance Notes* series.

The new series reflects developments in construction procurement over recent years and builds on government clients' experience of implementing the *Achieving Excellence in Construction* initiative.

High level guides



Core guides

Supporting guides

07 Whole-life costing and cost management

Value for money is the optimum combination of whole-life cost and quality to meet the user's requirement. This means that awarding contracts on the basis of lowest price tendered for construction works is rarely value for money; long-term value over the life of the asset is a much more reliable indicator. It is the relationship between long-term costs and the benefit achieved by clients that represents value for money.

Introduction

Costs and value are not always well managed by clients. A benchmarking study of government construction projects in 1998 showed that three quarters of the projects exceeded their budgets by up to 50%. Some clients are focusing on the wrong goal – lowest tender price rather than best value; but concentrating on the initial capital costs of a construction project does not give value for money. Clients need to think in terms of achieving value by meeting the needs of end-users with a higher quality project at lower whole-life costs.

In addition, a study by Mott MacDonald for HM Treasury in 2002 showed that clients were frequently over-optimistic in their estimates of costs and the time required for delivery. In some cases, actual budgets were twice as much as the estimates. The study concluded that clients need a better understanding of the basis for their estimates.

This guide explains how to manage costs throughout the life of a facility. The focus is on whole-life costs – that is, the cost of design and construction, the long-term operational and maintenance costs and the costs associated with disposal.

The guide outlines the principles of whole-life cost management and describes a process made up of:

- a framework for cost management
- establishing baseline costs – expected operational costs of the asset
- estimating whole-life costs – every cost likely to be incurred from inception of the project to disposal, construction costs and risk allowance
- cost management and reporting.

Principles

Definitions

Whole-life costs

The whole-life costs of a facility (often referred to as through-life costs) are the costs of acquiring it (including consultancy, design and construction costs, and equipment), the costs of operating it and the costs of maintaining it over its whole life through to its disposal – that is, the total ownership costs. These costs include internal resources and departmental overheads, where relevant; they also include risk allowances as required; flexibility (predicted alterations for known change in business requirements, for example), refurbishment costs and the costs relating to sustainability and health and safety aspects.

Cost management

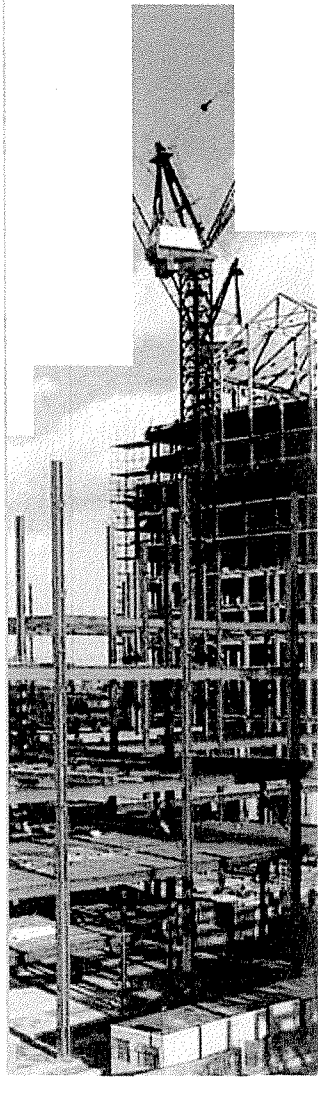
Cost management is the process of planning, estimating, coordination, control and reporting of all cost-related aspects from project initiation to operation and maintenance and ultimately disposal. It involves identifying all the costs associated with the investment, making informed choices about the options that will deliver best value for money and managing those costs throughout the life of the project, including disposal. Techniques such as value management help to improve value and reduce costs (see *AE4:Risk and value management*). Open book accounting, when shared across the whole project team, helps everyone to see the actual costs of the project.

The real costs of an asset

Long-term costs over the life of the asset are more reliable indicators of value for money than the initial construction costs. This is because:

- money spent on a good design can be saved many times over in the construction and maintenance costs. An integrated approach to design, construction, operation and maintenance with input from constructors and their suppliers can improve health and safety, sustainability, design quality; increase buildability; drive out waste; reduce maintenance requirements and subsequently reduce whole-life costs. It is important to take a whole-life approach to the asset, whether or not the same team is responsible for design, construction, operation and maintenance
- investment in a well-built project can, in turn, achieve significant savings in running costs.

This means that the department should be prepared to consider higher costs at the design and construction stages in the interests of achieving significant savings over the life of the facility. It is essential to consider long-term maintenance very early in the design stage; most of the cost of running, maintaining and repairing a facility is fixed through design decisions made during the early part of the design process.



07 Whole-life costing and cost management

Promoting excellence in design does not necessarily mean a more costly job if whole life costs are taken into account. The Royal Academy of Engineering reports that the typical costs of owning an office building for 30 years are in the ratio of 1 (for construction costs): 5 (for maintenance costs): 200 (for costs of the operation being carried out in the building, including staff costs). Consultancy fees account for 10-15% of the construction cost (that is, 0.1-0.15) when compared with 200 operational cost. The focus on whole-life cost should start from the business case by increasing the value in the operational aspect while keeping the maintenance as low as possible. In this way the initial construction cost can be recovered, since this initial cost is the smallest amount and optimising the other two figures will have saved more than the construction costs. The 200 figure is expenditure by the client organisation on operating the facility; it should also reflect the benefit of that facility to the department or the public at large. While a hospital may cost 200 times its construction cost over 20 years to provide a service to patients, a well designed hospital may cost considerably less and a poorly designed one considerably more.

Time and effort spent on the design stage will save significant amounts of money downstream.

A key part of any whole-life cost assessment must be to address the sustainability aspects of the facility. In some areas there are clear links between whole-life costs and sustainability, such as the direct costs of energy usage. Even if the integrated project team does not operate and maintain the facility, it should be designed for convenient, cost-effective and safe operation and maintenance.

Avoiding cost overruns

The main ways for the client to avoid cost overruns are to have:

- objectives that are realistic and not changed during the course of the project
- estimates for project approval that are realistic – that is, not unduly optimistic
- a project brief that is complete, clear and consistent
- a design that meets planning and statutory requirements
- a design that is coordinated and takes account of buildability, maintainability, health and safety and sustainability
- risk allocation that is unambiguous and clear to all parties involved
- clear leadership and appropriate management controls
- simple payment mechanisms that incentivise all parties to achieve a common and agreed goal.

If the client works with the integrated project team at the early stages, more accurate and robust estimates can be prepared, which can be benchmarked against other schemes and client costs to ensure that value for money is achieved.

Who is involved in whole-life costing and cost management?

The investment decision maker is accountable for any decisions relating to the cost of a project or programme. Whole-life costings should provide the information necessary to make the best decisions in terms of procurement route (see *AE6:Procurement and contract strategies*).

The senior responsible owner is responsible for ensuring that budgetary estimates are based on whole-life costs and is assisted by the project sponsor and project manager, as appropriate, together with additional client advice as required, such as value managers and cost consultants.

The integrated project team has an essential part to play in delivering value for money. The team members responsible for design and construction should work together to identify the most cost-effective design solution over the life of the facility. The integrated project team should advise on how the design will affect cost during construction and the operational efficiency of the completed facility; they should also advise on buildability and health and safety aspects in consultation with the planning supervisor.

Cost models are described in the next section. The whole-life cost model for a specific project will be developed and subsequently updated by different parties according to the project stage reached and the form of procurement adopted. Integrated project team members work together on updating the model. At project inception, the model might be developed in-house or by an independent client adviser. Tenders will be evaluated on the basis of whole-life costs, and hence at tender stage, the bidder will prepare the model. Where a framework contract is already in place, the framework supplier might be the most appropriate organisation to develop the model.

Whole-life costing

A framework for making decisions on whole-life costs

All parties in the supply chain, including material and component suppliers and specialist suppliers, need to have reliable data on the operational costs of their products, including running and maintenance costs. The main aims of the framework are:

- integrating the design and construction processes, so that the IPT can take responsibility for the cost and quality implications of their design, with input from those who will be responsible for operating and maintaining the facility
- involving the integrated project team early on so that they can advise on how the design will affect cost, health and safety during construction and in use, speed of construction and the operational efficiency of the completed facility

07 Whole-life costing and cost management

- taking early account of the needs of the end-users of the facility in order to avoid costly design changes at a later stage
- using opportunities for off-site fabrication and standardisation of building components to improve cost-effectiveness and efficiency on site; integrated teamworking is essential for achieving the required precision in planning and design
- making sustainability of the completed facility a priority, taking full account of its whole-life costs
- materials wastage close to zero compared with industry best practice of 10%
- labour productivity of 65-70% compared with best industry rates of 54%
- a regime where continuous improvement can be demonstrated.

Wherever possible, make the integrated supply team responsible for proving the accuracy of their cost prediction of running costs, whether or not they subsequently maintain the facility. This is a requirement for Prime Contracting.

Establishing baseline costs: overview of the process

Establish the expected operational running costs of the facility. For the whole life of the facility, produce a quantified estimate of running, maintenance and other support costs of operating the proposed building, including the costs of disposal. Compare options based on net present value. HM Treasury's *Green Book* provides advice on how to do this. (*http://www.hm-treasury.gov.uk/economic_data_and_tools/greenbook/data_greenbook_index.cfm*).

Check how these running costs compare with costs for existing buildings and other comparable facilities. If costs are higher, how are they justified? The Building Cost Information Service (*BCIS www.bcis.co.uk*) provides a source of such data. However, it is difficult to derive benchmarking costs without knowledge of the way the facility being considered is managed and details of the design, such as additional insulation.

Develop the design

Ensure that:

- the project team is integrated from the outset of the design process, to enable specialist suppliers to contribute to the design
- enough consideration is given to opportunities for optimising the operational efficiency of the facility.

Make 'value' explicit: design to meet a functional requirement for whole life cost:

- draw up a design brief that is output-based with explicit reference to value; involve the users of the facility and others in its development
- specify at an early stage any constraints on capital costs (note that constraints here may affect ability to deliver best whole-life value for money) or whole-life target costs.

The business case should look beyond the cost of ownership to the value of the facility and the output specification should be clear about how that value could be improved – for example, faster throughput for an operating theatre. The integrated project team can then work with the client stakeholders to explore the best ways of increasing value within the business case framework.

Assess the proposed method of construction

Use techniques such as value management and value engineering to minimise the potential for waste and inefficiency and optimise the use of materials over the lifespan of the facility. Quantify the impact on whole-life costs that will be delivered by the construction process.

Specify the requirements in output terms – that is, what is required to meet the business need; not the detail – for example, numbers of windows and thickness of walls should not normally be specified by the client. This allows the integrated project team to propose ways of meeting these requirements in the most cost-effective way (using value management and engineering techniques) and also to suggest innovative solutions (see *AE4:Risk and value management* and *AE9:Design quality*).

Determine the baseline against which to measure the actual performance achieved

Set the cost baseline:

- total investment needed to complete a facility, such as the cost of design, construction cost and land cost
- estimated running cost of the completed facility over its operational life.

Note that the initial budget estimate and all subsequent budget estimates should allow for all costs in connection with the project – in-house costs, consultancy costs, land costs, legal costs, operation and maintenance costs, design and construction costs, concession payments and decommissioning costs. It should also include a risk allowance and provision for VAT.

Benchmark the baseline

Compare capital and predicted whole-life costs with the benchmark cost for a similar facility procured in the same way (such as Design & Build):

- calculate the benchmark costs and record data for future benchmarking. Note that this is often difficult in practice as there may be little available data on actual costs as opposed to prices of materials; there may also be limited reliable information about maintenance and energy costs (see Annex B for notes on historic and predictive costs; see also the Further information section at the end of this guide)

- aim for the integrated project team to deliver better value rather than lower margins
- seek opportunities to further reduce predicted whole-life costs without reducing quality or value by using value engineering during the design process
- consider the scope for allowing higher capital costs to reduce running costs – for example, investment in more efficient heating systems
- consider the scope for sharing any further savings made during the construction of the facility.

The value engineering process works by enhancing whole-life value, not by squeezing profit margins or initial construction costs.

Integrate project activities:

- manage costs collaboratively, with the integrated project team engaged at the earliest stages wherever possible – using target costing, value management and risk management
- avoid fixing a guaranteed maximum price until the design stage is complete, to ensure quality and functionality for the client; if the price has to be fixed at an earlier stage, agree an incentive scheme for the sharing of benefits
- aim for a clear understanding of actual construction costs, in terms of labour, plant and materials. Separate underlying costs from risk allowances; distinguish between profit and overhead margins.

Estimating whole-life costs

Whole-life costing is aimed at answering the question: 'What is the cost of achieving this objective in this way?'. It is always considered in relation to quality in meeting the business need, in order to determine value for money. Different solutions to meeting the business need could result in significantly different cost profiles and contract duration; appraisal of options needs to be flexible enough to compare very different approaches. Engagement with the integrated project team at the earliest possible stages – even the Strategic Outline Business Case – allows the parties to work together to identify risks/problems and resolve them. Sensitivity analysis is also important, to challenge assumptions about uncertain future events and hence variations in costs. HM Treasury's *Green Book* provides advice on sensitivity analysis.

'Optimism bias' – that is, a tendency towards over-optimism – needs to be assessed with care, because experience has shown that being unrealistic about benefits that can be achieved in relation to risk will have a significant impact on costs. Over-optimism about time and cost estimates in relation to risk would significantly alter the balance of actual cost/benefit/risk and hence the basis for justifying the investment.

Clients are often too optimistic about what their project will cost and how well they can manage risk. A recent report showed that many departments frequently underestimated costs and risks by 50%, often much more.

[Source: Report for HM Treasury 2002 (Mott MacDonald)]

Assess the value to the business operations – can the cost be justified?

The most important aspect when considering the whole life of a facility is how it will enhance the core business operations that will take place in, on or around it. There must be a very clear understanding of what those business operations currently are – and how they might change in the future – before the output performance requirements of the facility can be determined and an estimate of the likely cost made.

Check that the facility will meet the brief developed with the users and is flexible enough for future operational change while remaining affordable.

Note that the business benefits from a facility cannot be achieved until it is complete and put to use, so the time to completion is a crucial factor. The improvements in time savings during the design and construction stages that have been realised through Private Finance Initiative projects demonstrate what can be achieved when the full economic assessment of a project is taken into account over the long term.

It is at the design stage that the greatest value gains can be achieved. Best practice clients take a long-term view of the likely quality of the completed facility and how the design will influence the cost of running the facility over its operational life. They recognise that badly designed facilities have high maintenance costs, could be dangerous and can be both inefficient and costly to construct.

Produce an output-based specification

Specifications should be output-based, setting out the functional requirements; they should not be prescriptive and should avoid setting out the process or details of how the end product is to be achieved. (See *AE9:Design quality*.)

Output-functional specifications help to:

- focus the end-user's mind on what functions the facility is to perform
- allow the supply team the greatest opportunity to innovate and find ways of enhancing the function of the facility while reducing its whole-life costs.

Output specifications should provide sufficient flexibility to allow the different elements of the facility to be upgraded in relation to their respective lifespans. For example, internal layouts of office buildings typically change every 5-7 years.

07 Whole-life costing and cost management

Consider the elements that make up whole life costs

It is important to focus on future trends rather than compare against the costs of the past. Where historical data is available, it may provide misleading information, such as the past mistakes in the industry in focusing on lowest price. Irrespective of whether or not historical cost information is available, it is always preferable to estimate the costs from first principles and only to use historical cost information as a check (see Annex B).

Where the budgets for capital expenditure, maintenance and utilities such as energy are not held by one individual, the holders of the separate budgets will need to work together to arrive at the optimum whole-life cost solution.

Defence Estates' Building Down Barriers initiative includes a framework for making decisions on whole-life costs. All parties in the supply chain have to provide reliable data on the operational costs of the products, including maintenance costs.

The aim is that the whole-life cost model should include every cost likely to be incurred in respect of the facility from inception to disposal. This section identifies some of the elements that need to be included in the model but are often not. It should not be regarded as an exhaustive list.

Each part of a facility has its own physical and economical lifespan. The model will need to reflect the economical lifespan of each part. See HM Treasury's *Green Book* for more information on economic appraisal.

In-house resources

These should include the total costs to the client organisation for all staff time and other resources relating to the project and should include the relevant proportion of all overhead resources.

Planning costs

There will be costs associated with obtaining planning permission for construction of a facility; there may also be a requirement for planning permission for a refurbishment project. Note that there may be additional costs if there is a delay; it is important to allow a realistic time period.

Consultancy fees

The total costs of all consultancy fees incurred for the project at any stage from inception to disposal should be included in the model. Consultancy fees might be incurred through any of the following:

- procurement advice and development of client brief
- legal advice
- fees linked to purchase of site/assets
- cost consultancy

- change management
- financing
- design
- value management and risk management
- project management
- economic appraisal
- planning supervisor role
- advice on technical issues.

Note that if too many advisers are appointed outside the integrated project team, this will tend to increase the cost without a commensurate increase in the value delivered.

With an integrated procurement route, some of the above elements will not appear as separate items but be included as part of an integrated design and construction package.

IT costs

Where not included in design/construction/project management costs, there may be IT costs – for example, for three-dimensional modelling of the proposed facility, planning for prefabrication of construction components and project scheduling.

Construction costs

These are described in detail in the next section.

Health and safety

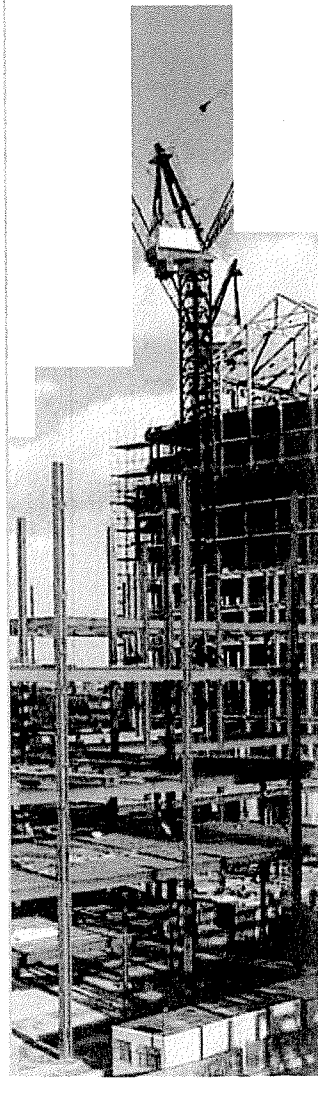
Health and safety issues arising in the construction, occupation, maintenance, alteration and disposal of the facility should be included in the model. Initial failure to address the ease with which the built environment can be safely maintained can lead to unnecessary costs and risks to health and safety at a later date. The Construction (Design and Management) Regulations 1994 place specific duties and responsibilities on clients. For further information, see *AE10:Health and safety.*

Security

The cost of providing a full security service at each point of entry and exit to a facility is considerable and is often overlooked during the early development stages. There may also be other security issues as design considerations.

Operations

The aim is to identify the total resources necessary to operate the facility. There is often an overlap between this element and the resources necessary to carry out the core business operations of the organisation, including staff costs and IT infrastructure costs. The important aspect is to consider how the performance of the facility can be improved to optimise the resources used for both elements. There should be a risk allowance to cover risks that materialise during the operational life of the facility.



Cleaning

The sustainability of a facility can be attributed in part to maintaining it in its original state and that requires a structured, effective cleaning regime. Cleaning of the facility, both internally and externally, needs to be addressed at the outset. The design can have a significant impact on the ease of cleaning and even on the frequency at which cleaning is required.

Maintenance

The maintenance strategy needs to be developed during the early stages of the project. Allowance needs to be made for the total resources for normal routine maintenance, regular inspections and, where appropriate, testing as well as for replacement of elements through normal wear and tear. The costs of providing accommodation and other facilities for maintenance activities, such as access, need to be addressed. The costs of disruption to business operations and/or the resources incurred in decanting staff while maintenance operations are carried out should be included.

Utilities

The total costs for different forms of utility supply, such as heating, cooling, power, lighting, water and waste, should be allowed for.

Alterations

There needs to be consideration of the likelihood for future changes to the facility that may be required as a result of changes in the way that the core business operations are carried out. Any allowance considered necessary should include the total costs of making the alterations, including those incurred when moving staff. Ideally, adequate flexibility needs to be included in the parts of the facility where changes may occur, while remaining affordable.

Disposal

Consideration needs to be made of how the facility will be disposed of and whether it will have any residual value at that time. This may include demolition or sale.

Carry out a risk analysis

There will need to be a comprehensive risk analysis, listing all significant risks that might occur over the life of the facility. For further information on risk analysis, see *AE4:Risk and value management*.

There are several areas where costs might increase at a rate higher than inflation for a variety of reasons. These might include maintenance activities, use of labour for site activities and green taxes. These can be addressed in the same way as any other risks. For each risk, the probability of occurrence and the likely impact can be established and a risk allowance made.

Estimating construction costs

This section provides advice on the preparation of budget estimates for the construction component of the project and the calculation of risk allowances. Budget estimates should, for each element, consist of a base estimate and a risk allowance. The risk allowance should be calculated for identified risks and not be

just guessed at as a percentage of the total (the term 'contingency' should not be used). The risk allowance may well exceed the base estimate during the early project stages and will gradually reduce as the project develops. Expenditure of risk allowance should be for identified risks only. Project change control procedures should be invoked where unidentified risks occur (see *AE3:Project procurement lifecycle* for more details).

The most important aspect of estimating the construction costs is to predict the outturn capital cost of the project at the earliest project stages. An estimate that fails to predict the outturn cost with some degree of certainty is of little value.

It is essential to produce an estimate that allows properly for the cost consequences of risks and that ultimately predicts the outturn costs, rather than generate a very detailed costing of every single item but fail to allow for risks and hence fail to predict the outturn cost accurately. However, it is recognised that cost-estimating accuracy should increase as the project progresses, risks either materialise or not, and requirements are tied down.

Construction cost elements

The construction cost of a project is made up of many elements, which include:

- in-house costs and expenses (including all central support services, administration, overheads, etc)
- consultancy fees and expenses (such as financial, technical, legal advice)
- land costs
- wayleaves and compensation
- demolition and diversion of existing facilities
- new construction or refurbishment costs
- insurances.

The cost estimate for the construction components of a project should address each element to arrive at the total cost estimate for the project. Focusing on any individual element of the total project cost in isolation might result in a distorted picture because a reduction in one element could result in an increase in cost for another element. (See Annex C for examples of elements.)

During the early project stages, the cost estimates for each element necessarily will be based on the limited outline information available. However, estimates still can be prepared, although it may be necessary to make a number of assumptions. Any assumptions should be set down clearly so that they can be verified if necessary and referred to at a later stage.

Estimates will need to be prepared for a number of options, some of which may include Private Finance Initiative projects. Advice should be sought from the departmental Private Finance Unit or HM Treasury's Private Finance Unit.

All such comparisons should be calculated as net present value for a realistic Private Finance Initiative contract duration in line with the guidance in *Treasury Taskforce Technical Note No 4: How to construct a public sector comparator.*

As the project progresses and becomes more clearly defined, the construction cost estimates need to be revisited and more finely tuned to reflect better, more detailed information as it becomes available.

Risk allowance

Each element of a cost estimate comprises two components: the base estimate and the risk allowance. The base estimate is the estimated cost of the element without any risk allowance included. The risk allowance is that sum calculated as part of a formal risk analysis to allow for identified risks (see *AE4:Risk and value management*).

Standards and sources of information for whole-life costing

Whole-life costing is covered by a British and International Standard – BS ISO 15686: Service life planning of buildings and constructed assets. Annex A sets out the structure of this standard; Annex B describes historic costs and predictable costs. In addition, the Further information section at the end of this guide provides details of data sources.

Cost management

Cost management and reporting: overview

Management of the overall cost of the project is the responsibility of the project manager, reporting to the project sponsor. Delegations and limits of authority for these two roles should be agreed at the start of the project, so that everyone knows exactly what they are empowered to do in managing project costs.

The main tasks are:

- to manage the base estimate and risk allowance
- to operate change control procedures
- to produce cost reports, estimates and forecasts. The project manager is directly responsible for understanding and reporting the cost consequences of any decisions and for initiating corrective actions if necessary
- to maintain an up-to-date estimated outturn cost and cashflow
- to manage expenditure of the risk allowance
- to initiate action to avoid overspend
- to issue a monthly financial status report.

The objectives of cost management during construction include:

- delivering the project at the appropriate capital cost (having considered the implications of quality, programme and whole-life objectives, using the value criteria established at the start of the project)
- ensuring that, throughout the project, full and proper accounts are monitored of all transactions, payments and changes.

The principal areas of cost management are:

- scope – defining what is to be included in the project and limiting expenditure accordingly
- programme – defining the project programme from inception to completion. Estimates and cash flow should be consistent with the programme
- design – ensuring that designs meet the scope and budget; delivering quality that is appropriate and conforms to the brief
- commitments – ensuring that orders are properly authorised
- contracts and materials – ensuring that the contracts provide full and proper control and that all costs are incurred as authorised; ensuring that materials are properly specified (in output terms) so as to meet the scope and design and that they can be procured effectively
- risk allowance – ensuring all expenditure relating to risks is appropriately allocated from the risk allowance and properly authorised; and monitoring use of risk allowance to assess impact on overall outturn cost
- cashflow – planning and controlling both commitments and expenditure within budgets so that unexpected cost over/under runs do not result; ensuring that all transactions are properly recorded and authorised and, where appropriate, decisions are justified.

Financial reviews at key decision points

There should be a financial review at each Gate and other major decision points. The Gateway process is summarised in the companion document *Achieving Excellence in Construction: A Manager's Checklist*.

Each financial review should ensure that:

- the latest estimate is compared with the previously approved budget and does not exceed it without fully reasoned justification
- the latest estimate of cost is made up of the base estimate for whole-life costs and the risk allowance
- the risk allowance is for identified risks only (not an assumed contingency provision)
- the project is still affordable
- funds are available for planned expenditure.

Management of the risk allowance

The project sponsor should manage the risk allowance, with support and advice from the project manager. Essentially, management of the risk allowance consists of a procedure to move costs out of the risk allowance into the base estimate for the project work as risks materialise or actions are taken to manage the risks. There must be formal procedures for controlling quality, cost, time and changes. Risk allowances should only be expended when the identified risks to which they relate occur. When risks occur that have not previously been identified, they should be treated as changes to the project. Similarly, risks that materialise but have insufficient risk allowance made for them will also need to be treated as changes.

Risks and the risk allowance should be reviewed on a regular basis, particularly when formal estimates are prepared, but also throughout the design, construction and equipping stages. As more firm commitments are entered into and the work is carried out, so the risks in future commitments and work are reduced. The estimate for the risk allowance should reflect this. (See also *AE4:Risk and value management*.)

Change management

The client must make every effort to avoid introducing changes after the briefing and outline design stages are complete. Changes can be minimised by ensuring that the project brief is as comprehensive as possible early on and the stakeholders have approved it, which might involve:

- early discussions with planning authorities to anticipate their requirements
- undertaking adequate site investigations, or condition surveys if existing buildings are to be renovated
- ensuring that designs are adequately developed and coordinated before construction begins
- imposing discipline on users to finalise and sign off their requirements in strict accordance with the project programme.

Elemental cost planning

In an elemental cost plan the estimate is broken down into a series of elements that can then be compared with later estimates, or with actual costs as the project progresses. For building projects, the most widely used breakdown of elements is that produced by the Building Cost Information Service (BCIS). Typically, each element is treated as a cost centre, but money may be transferred between elements, provided a reasonable balance between elements is maintained and the overall target budget is not exceeded. The initial cost plan is likely to be based on approximate figures, which provide a fair basis for determining the validity of future estimates. Control by the project manager is achieved by an ongoing review of estimates for each cost centre against its target budget. As design develops and is costed, any variance in cost from the cost plan is identified. Decisions are then taken on whether that element can be permitted to increase in cost, which would require a corresponding reduction elsewhere, or whether the element must be re-designed in order to keep within the budget.

Annex C provides a sample set of cost elements.

Continuous and stage estimates

The project manager is responsible for ongoing reviews of designs as they develop and providing advice on costs to the integrated project team. This continuous costing is of great benefit in assessing individual decisions and is particularly important on large and complex schemes. There also needs to be a periodic formal assessment of the whole scheme, as budgetary estimates, at each project stage.

Cost control during design development

The project sponsor has overall responsibility for the project, including the estimated cost, and will need to be satisfied that appropriate systems for controlling cost are in place and operating. Where significant costs are attached to a design, these must be properly reviewed against the budget decision and properly authorised. The project sponsor may delegate a level of financial authority for design development decisions to the integrated project team, appropriate to the project. For complex projects there might be delegated levels for each cost centre. Value management and value engineering have an important part to play in influencing costs – see *AE4:Risk and value management*.

Cost management during construction

During construction, instructions issued to the integrated project team, whether for change via a formal change control procedure, or for clarification of detail, have a much more immediate impact on cost. The project sponsor needs to establish procedures for instructions and information that ensure:

- instructions are issued within delegated authority
- instructions are costed and their impact assessed before issue
- the instruction is justified in terms of value for money and overall impact on the project
- the cost of all instructions is monitored on a continuous basis
- specific approval is sought and given where costs are forecast to be outside delegated authority.

Payment

The client, as the contracting party, is responsible for paying the integrated supply team the interim and final payments to which they are entitled. In most construction contracts there will be milestone/stage payments due during the course of the work. The project sponsor, on the advice of the project manager, should keep the client organisation's finance division aware of future payment requirements by means of the updated cashflow forecast.

Note that for PFI projects, payments do not start until the service becomes available.

The terms of the contract may allow integrated supply teams to claim additional payments in certain circumstances defined in the contract conditions. These are generally due to:

- risks occurring that are client risks under the contract
- ordering of additional/varied work
- failure by the client to comply with its obligations under the contract – often expressed as disruption to the integrated project team's work programme due to changes or late information.

Final accounts

The payment process should be managed as effectively as the design/construction process. All payments should be made on time and payments for variations, provisional sums, etc should be discharged as the work is carried out.

Annex A: BS ISO 15686 – service life planning of buildings and constructed assets

Whole-life costing is covered by a British and International Standard: BS ISO 15686 – service life planning of buildings and constructed assets. Service life planning addresses the design of a structure or a building with a view to its operation through its whole life. It means looking at long-term performance and overall operating costs at the design stage and earlier, enabling the design to be tailored to meet clients' long-term needs.

Part 1: General principles

This provides a methodology for whole-life costing of buildings and other structures. It is based on prediction rather than on past performance, where that is not available. Published as a full BS ISO in 2000, it was tested in the UK by the MoD on the Building Down Barriers project.

Part 2: Service life prediction principles

This describes a procedure for service life predictions of individual building components. It is a prediction method, not based on past performance; primarily applicable for test and approvals laboratories. Published as a BS ISO in 2001.

Part 3: Performance audits and reviews

This is concerned with ensuring the effective implementation of service life planning. It gives a basis for internal reviews or for formal third-party audits. Published as a BS ISO in 2002.

Parts 4 and 5: Life cycle costing (in preparation)

Part 4 is for use in conjunction with other parts of BS ISO 15686 when lifecycle costing is to be included in service life planning.

Part 5 will deal with guidance on assessment of the lifecycle costs and maintenance planning of a building.

Annex B: Historic and predictive costing

Historic costs

These are based on analysis of similar facilities in use, such as:

- £/m²/year
- £/occupant/year
- £wlc (whole-life cost) as percentage of capital cost.

They are useful in providing quick, broad estimates, but:

- cost build-up is not always explicit
- they can lack robustness
- they are unlikely to be suitable as a cost-optimisation tool.

Predictive costs

For each building element/component/location:

- what maintenance/replacement will be needed?
- when and how often?
- how much of it?
- at what cost?

Note that it is always preferable to estimate the costs from first principles and only to use historical cost information as a check.

A further advantage of the predictive approach is its greater capability to spread cost by carrying out minor repairs or postponing repairs in certain areas in order to smooth peaks and troughs in expenditure profiles.

Computer applications can help by computing whole-life cost by plotting design and durability data, as well as predicting cost based on what-if scenarios and comparing installation expenditure with operating cost (for example, heating installation with energy efficiency).

A recommended approach is to use standard software such as Excel and adapt it to perform the required tasks, building in a facility for key variables. Specialist software does exist but most versions are not as adaptable and cannot process variable data as efficiently.

[Source: CIRIA]

Annex C: Sample set of cost elements

As an example of elemental cost planning, BAA groups its elements as follows:

- enabling works within building
- substructure
- structure
- envelope
- interiors
- fixtures, fittings and equipment
- services
- specialist services
- services within tunnels
- site works
- below ground structures
- above ground structures
- external works including pavings, roads and railtrack
- airfields
- landscaping
- external services
- external specialist services
- preliminaries/general items
- risk allowances.

Within each group there are a number of elements. The table below shows the elements that make up the first three groups. [Source: BAA]

Group	Elements
Enabling works within building	Demolishing parts of buildings Alterations Other enabling works within building
Substructure	Strip foundations Pad foundations Piled foundations Raft foundations Basements Structure within basements Specialist foundations Other foundations
Structure	Frame Upper floors Stairs and ramps Roof structure Pits Other structure

Further information

HM Treasury's *Green Book, Economic Appraisal in Central Government,* is the overarching document and starting point for all investment decisions (available from HM Treasury website at *www.hm-treasury.gov.uk* and in the OGC Successful Delivery Toolkit). Advice on government procurement policy in the United Kingdom is provided in Procurement Policy Guidelines available in the OGC Toolkit.

The following documents and information sources are also relevant to whole-life costs:

- *Whole Life Costing,* A client's guide – Confederation of Construction Clients (this is a key document that should be read in conjunction with this guide – see *www.clientsuccess.org.uk*)
- *Building Down Barriers: Handbook of supply chain management,* CIRIA (*www.ciria.org.uk*)
- *Achieving Sustainability in Construction Procurement: Sustainability Action Plan,* OGC
- *Whole Life Costing,* BRE Report 367 (*www.bre.co.uk*)
- *Service Life Planning: Part 1, ISO 15686-1* (*www.bsi-global.com*)
- *Whole Life Costing and lifecycle assessment for sustainable building design,* BRE Digest 452
- *Waste minimisation and recycling in construction: design manual,* SP134 CIRIA 1998
- *HAPM Budgeting for Sustainability* - key sources of whole life value data can be found at *www.bre.co.uk/sustainableprocurement/print.jsp?id=10*
- *BS 7543 Guide to durability of buildings and building elements, products and components* (AMD 9854)
- Building Maintenance Information Ltd (BMI produce publications of regularly updated indices on building maintenance costs for different types of buildings – see *www.bcis.co.uk/order/bmipub.html*)
- Energy Efficiency Best Practice Programme, provides impartial, authoritative information on energy efficiency techniques and technologies in industry and buildings (*www.carbontrust.co.uk/energy*)
- *RICS Surveyors' Construction Handbook Part 2: Section 2 Life Cycle Costing* (*www.rics.org/RICSservices/BCIS/*)
- *HM Treasury Report,* Mott MacDonald, 2002.

OGC

Office of Government Commerce, Trevelyan House, 20 - 30 Great Peter Street, London SW1P 2BY
Service Desk: 0845 000 4999 E: ServiceDesk@ogc.gsi.gov.uk W: www.ogc.gov.uk