



No. 54 Value Management

This is one of a series of guidances prepared by CUP on the management of works projects. Its use is not mandatory but a statement of good professional practice. References to “the EC rules” are to the EEC Treaty, the EC procurement directives as implemented in UK legislation, rulings of the European Court of Justice and other relevant EC law. Departments can obtain advice and guidance on the EC rules from PP Division, HM Treasury.

1. INTRODUCTION

Aim

1.1 All projects involve the allocation of scarce resources and when complete, need to satisfy a range of users' requirements. The philosophy and techniques of value management (VM) provide a structured approach to the examination and development of a project which will increase the likelihood of achieving these requirements at optimum value for money. To be successful, it must be a **continuous process**.

1.2 Throughout this guidance the term **value manager** is used although this does not necessarily imply a separate role. Whilst on larger or more complex projects this might be appropriate, on smaller ones it might be undertaken by the project sponsor's professional adviser, project manager, construction manager etc (see guidance No 33 (Revised) “Project Sponsorship”). However, when establishing a structure for dealing with value for money on projects, the project sponsor may need expert assistance, particularly at the ‘review’ stages.

Objectives and scope

1.3 This guidance explains the project sponsor's responsibilities for optimising and achieving value for money on projects, from concept to handover, occupation and beyond. It should be read in conjunction with guidance no 33 (Revised), 4 1 “Managing Risk and Contingency for Works

Projects”, 35 “Life Cycle Costing” and 38 “Project Approvals”.

1.4 This guidance is not definitive but aims to assist those responsible for the success of projects to recognise and understand the benefits of VM. Although its emphasis is on works projects, the techniques may be applied to all projects, whether for products, systems or services.

1.5 It concentrates on the essential principles: outlining what is involved and what may be achieved. It also introduces the main techniques explaining when each should be used. Project sponsors are not, however, expected to be expert in these techniques. They will need help from professional advisers, project managers and others in implementing a value for money approach.

1.6 The text is in six parts with supporting annexes:

1. Introduction

Aim, objectives and scope.

2. Value Management

Outline: what can be achieved; setting a framework; timing of reviews; workshops and life cycle costing.

3. Defining optimum value

Key objectives: defining project objectives and needs (the first review) and selecting the best approach (the second review),

4. Achieving optimum value

Key objectives: planning for VM during design development; appraising the developing design (the third review); concurrent studies and contractor's change proposals.

5. Who to involve

The value manager the project team; an external team; design liability and terms of appointment.

6. Action and feedback

Implementing recommendations for action, feedback and project evaluation.

- Annex A:** definitions
- Annex B:** contents
- Annex C:** the Job Plan
- Annex D:** brief description of Functional Analysis System Technique (FAST)
- Annex E:** elements to be included in a life cycle costing analysis
- Annex F:** review examples
- Annex G:** list of relevant guidances.

2. VALUE MANAGEMENT

Outline

2.1 Projects should only be commissioned following a careful analysis of need. Failure to think through the needs a project must satisfy will cause problems for subsequent design and construction stages. Many projects suffer from poor definition due to inadequate time and thought being given at the earliest stages. More fundamentally, this is likely to result in cost and time overruns, claims, long term user dissatisfaction or excessive operating costs. Therefore, one of the first major tasks of project sponsors is to identify at the earliest possible stage the need for, and scope of, any construction works.

2.2 Most projects will eventually have to satisfy a range of customers whose needs, expectations and aspirations may not always be mutually compatible nor consistent with constraints on time and money. A careful analysis of need is much more than compiling a "wish list" of all possible requirements. It requires a consensus about needs and objectives, giving due weight to their relative value and importance.

2.3 VM provides a structured framework to achieve this. Requirements are evaluated against the means of achieving them as the project develops thereby ensuring that money and effort is spent where it is most needed and best value for money is achieved.

2.4 It is important that departments and project sponsors are committed to the introduction and implementation of VM, being well informed about what to expect and who to involve. Only then can the techniques be effectively introduced and the necessary resources and support provided.

2.5 Project sponsors should be active in encouraging a 'culture' or philosophy which seeks at all times to optimise value for money and drive out unnecessary waste or cost at every opportunity. While effective VM depends on a planned and systematic review of key project needs, objectives, priorities, constraints and options, project participants should be encouraged to review their own - and others' - decisions outside these planned reviews.

What can be achieved?

2.6 VM is primarily about enhancing **value** and not with **cutting cost** (although this is often a by product). The philosophy and techniques of VM attempt to provide the required quality at optimum cost during the

process of developing a project. The **philosophy** centres on the identification of the requirements. The **techniques** rely on using the **job plan (Annex C)** and **Functional Analysis Systems Technique (FAST) (Annex D)**, Properly organised and executed VM provides a structured basis for both appraisal and development of a project and can:

- identify and evaluate the need for construction works
- identify and prioritise the key objectives;
- identify and evaluate the major constraints and risks;
- improve the quality of definition;
- identify and evaluate the means of meeting needs and objectives;
- develop a shared understanding among key participants;
- ensure all aspects of the design are the most effective for their purpose;
- maintain a strategic focus on the department's needs during design and construction;
- provide a priority framework against which future potential changes can be judged;
- promote innovation; and
- eliminate unnecessary cost.

2.7 The issues involved in delivering a construction project are often complex with attendant risks and, therefore, invariably require numerous decisions by many teams and individuals with wide ranging capabilities and skills. Poor or wrong decisions can be made under the competing pressures of time, budget and quality. As a result, all projects are likely to include unnecessary costs. In North America value managers work on the principle that at least 10 per cent of a project's capital cost can be saved and case studies demonstrate savings of between 10 and 25 per cent. Such savings will more than offset the additional costs of implementing VM. However, cutting cost without proper analysis is likely to lessen value, therefore only **unnecessary cost** should be removed. In short, there must be no loss of function or quality, otherwise value is diminished.

2.8 VM aims to maximise project value within time and cost constraints. However, it should be recognised that improving project value sometimes initially requires extra expenditure. The key differences between VM and cost-reduction are that the former is:

- positive, focused on value rather than cost, seeking to achieve an optimal balance between time, cost and quality;
- structured, auditable and accountable; and
- multi-disciplinary, seeking to maximise the creative potential of all departmental and project participants working together.

2.9 Project sponsors should establish a workable VM framework for the continuous review of project development against their department's needs and objectives.

Setting a framework

2.10 An overall framework for the management of works projects incorporates the process of project definition - when needs are defined - as well as implementation - when needs are *satisfied*.

2.11 The project sponsor should ensure that a **Value Management Plan** is drawn up and incorporated into an early draft of the Project Execution Plan (PEPs are covered in guidance 33(Revised)). This plan should establish:

- a series of meetings and interviews;
- a series of reviews;
- who should attend; and
- the purpose and timing of the reviews.

It should not be a rigid schedule but a flexible plan, regularly reviewed and updated as the project progresses. It is essential that the project sponsor and value manager prepare for reviews by deciding on:

- the objectives and outputs required;
- the key participants and
- what will be required of them at different stages.

2.12 The extent to which VM can be used will depend to a large extent on the contract strategy proposed (see guidance no 36 "Contract Strategy Selection for Major Projects"). The techniques can be used fully in traditional, management and construction management contracts. Less use can be made of the techniques for the benefit of the client when the contractor is mainly responsible for design eg design and build, develop and construct and PFI projects. Nevertheless, the techniques are equally applicable to such projects when developing the statement of requirements and project brief.

Timing of reviews

2.13 The precise format and timing of reviews will vary according to particular circumstances and timetable. Too many and the design and construction process may be disrupted and delayed. Too few and opportunities for improving definition and the effectiveness of design proposals may be lost.

2.14 A dilemma in the early stages, when the approach can have the greatest impact (figure 1), is that all the information needed for a thorough identification and evaluation of the options is not available. Problems are often unclear and very difficult to define and outline solutions are only capable of appraisal in the broadest terms.

2.15 To exploit the benefits of VM whilst avoiding unnecessary disruption, there are at least three obvious, 'opportunity points' for reviews which arise on the majority of projects, see figure 2.

2.16 **Each of these reviews also provides an opportunity to undertake concurrent risk assessments (see guidance no 41 "Managing Risk and Contingency for Works Projects").**

2.17 Reviews at these stages are recommended in order to agree primary objectives and priorities, finalise the project brief and ensure that the best value for money project progresses into design and construction. However, the number of reviews actually held will vary depending on the project's scale and complexity. On simple projects, where the need and the key parameters can be clearly established from the outset, only one review may be necessary during the project definition stage. However, additional reviews may be needed on large and complex projects.

Figure 1

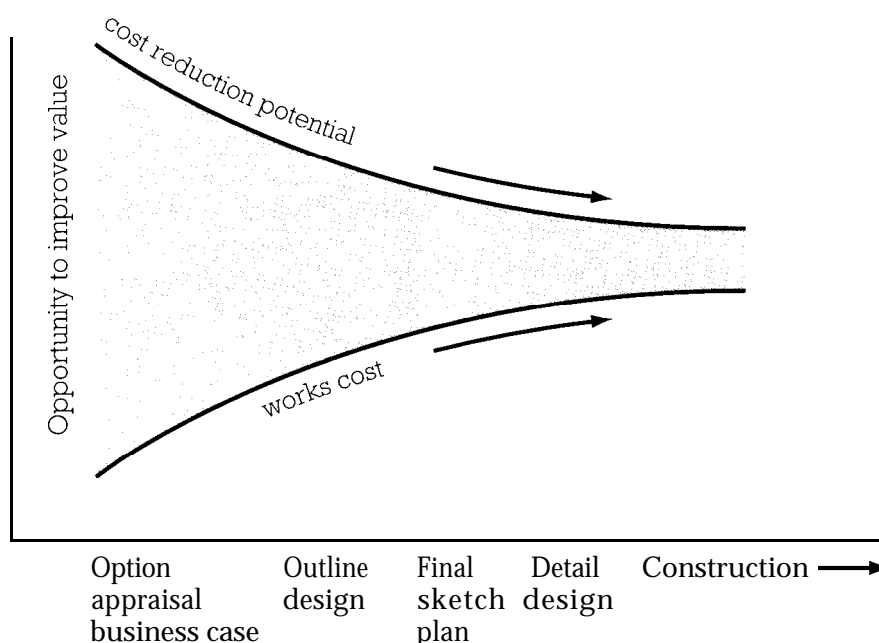
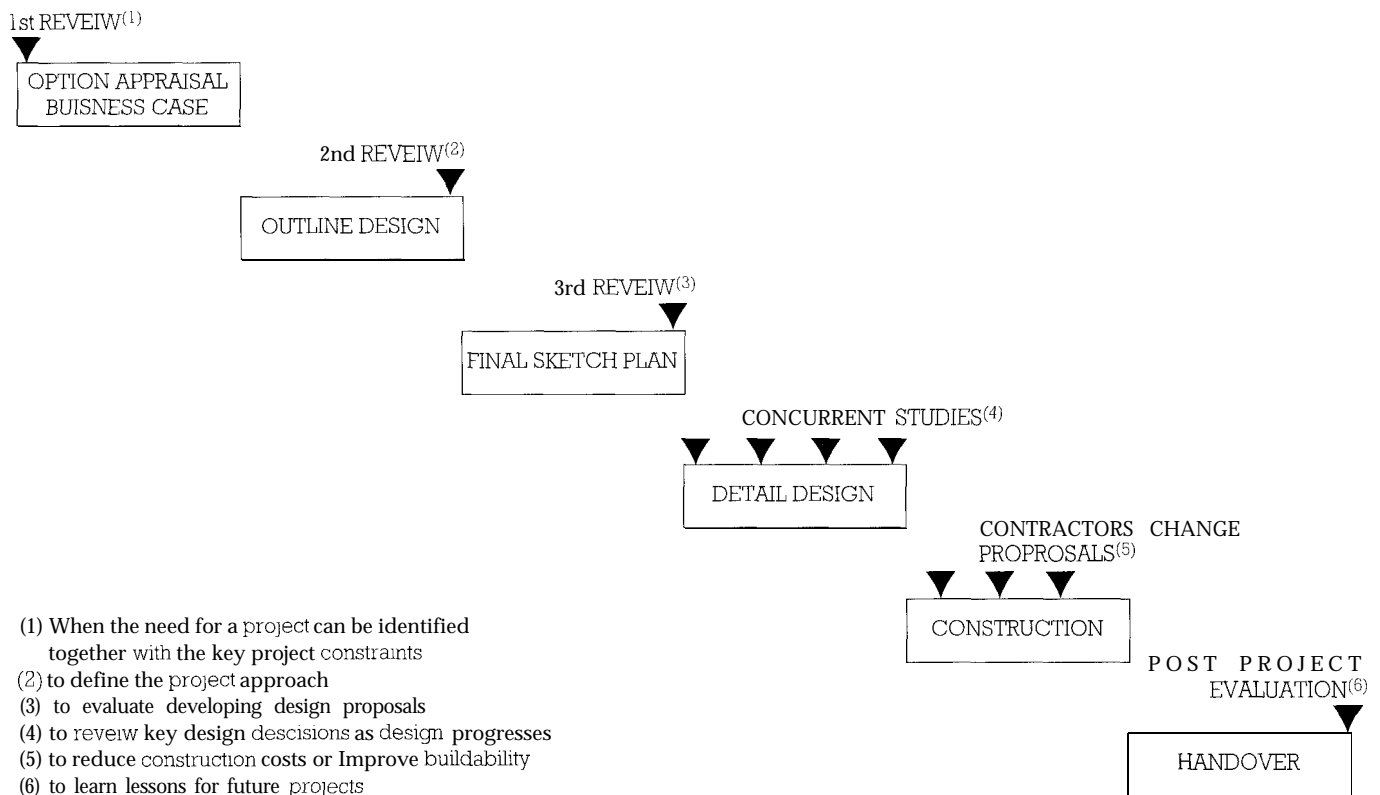


Figure 2



2.18 In addition to these reviews, further studies should be undertaken during the detail design stage. These are called “concurrent studies” (see paragraph 4.9) and demonstrate the continuous nature of handling value on projects.

Workshops

2.19 Most VM practitioners use a workshop approach to the reviews and studies mentioned later. Generally, in the UK, workshops for VM reviews last one/two days, although this can vary depending on the complexity of the project.

Life Cycle Costing

2.20 Life cycle costing is a vital element of VM. In developing projects it is essential that the approach is based on the cost of ownership rather than acquisition. Life cycle costing (often known as “through life” or “whole life” costing) is therefore a key element when seeking to optimise value for money. It will help in the decision making process when there is a choice of options.

2.21 Life cycle costing is a structured approach used to address all elements of cost based on the anticipated life span of a project. The visible capital cost represents only a small proportion of the total cost of ownership.

2.22 Life cycle costing is used to produce a spend profile which can be applied to various options at the definition stage and to design proposals during the implementation stages of a project. For example, in the case of a building, three broad categories can be used:

- capital costs;
- operating costs including:
 - staffing connected with the operation of the building;
 - energy consumption;
 - maintenance and associated consumerables;
 - cleaning;
 - insurance, rates etc; and
- disposal.

2.23 In many departments, the responsibility for acquisition and subsequent support funding is often held in different areas. It is important therefore that in using both value management and life cycle costing techniques these separate interests are brought together to ensure that all factors are taken into account. The reviews recommended in this guidance provide this opportunity. Annex E outlines the elements to be taken into account in a life cycle costing evaluation (see also guidance no 35 “Life Cycle Costing”).

3. DEFINING OPTIMUM VALUE

Key objectives

3.1 The project sponsor will be responsible for co-ordinating the identification of needs and objectives and resolving areas of potential conflict with contributions from key interested parties (**stakeholders**) whose likely requirements are outlined in guidance no 33 (Revised).

3.2 Departmental staff may well feel they have a clear picture of what is needed by the time the project sponsor is appointed. However, it is important to subject this initial definition of need to close scrutiny before deciding to progress further. The process of clarifying why the need exists in the first place **the primary objective** - and identifying what has to be done- to satisfy that need is the first key task of VM

3.3 At the early stages of project development, VM (**often called value planning**) is also used to:

- identify **key priorities** and constraints; and
- identify and examine **plausible solutions**.

3.4 The project options identified at this stage will be defined only in terms of broad project strategies. It is likely that a works project will be one solution, but there are certain to be others. The refurbishment of existing premises, investment in new equipment or organisational re-structuring are frequently considered as alternatives to a works project.

3.5 Ultimately, the project sponsor develops the project brief based on the statement of the primary objective and the key priorities and constraints identified. The project brief is a comprehensive statement of requirements and little useful design development work can be done without it. A project brief checklist is in guidance no 33 (Revised),

3.6 So that the brief can be finalised and the best value for money solution selected, departments are required to undertake a systematic appraisal of options and prepare a business case for new investment before granting preliminary project approval (see the Treasury 'Green Book' 'Economic Appraisal in Central Government: A Technical guide for Government Departments', HMSO ISBN O-1 1-560034-5 and guidance 38 'Approval of Works Projects'), Such approval will allow the necessary planning and design work to proceed so that more accurate estimates of time and cost can be provided to enable a decision on full project approval to be made. VM at this stage is a very effective means of identifying and prioritising project needs and appraising options and should form a key element in preparing the business case.

Defining project objectives and needs: The first review

3.7 It is unlikely that the first review will involve members of the project team. It is probable, however, that the project sponsor will need the help of experts to develop the brief and outline proposals. The key

project stakeholders should be represented by senior personnel. Soon after appointment, the project sponsor should hold a series of structured meetings and/or interviews with key stakeholders to define their understanding of the requirements for the new project as well as the needs in their particular areas of responsibility. In this way areas of potential conflict may be identified.

3.8 Subsequently, the first review should be held. This is important because it establishes the framework for subsequent VM and the key criteria against which design solutions will be evaluated. It does this by making explicit the:

- departments' value system and priorities;
- project needs and objectives; and
- key project constraints and risks.

This review should be multi-disciplinary and aim to exploit the creative problem-solving potential of the stakeholders, working together to identify the best value options.

3.9 The first review should be structured to follow the job plan (Annex C) and should:

- list all objectives identified by stakeholders;
- establish an objectives hierarchy by ranking the objectives in order of priority (see paragraph 3.10);
- identify broad approaches to achieving objectives by brainstorming;
- appraise the feasibility of options;
- identify potentially valuable options; and
- consider and preferably recommend the most promising option for further development.

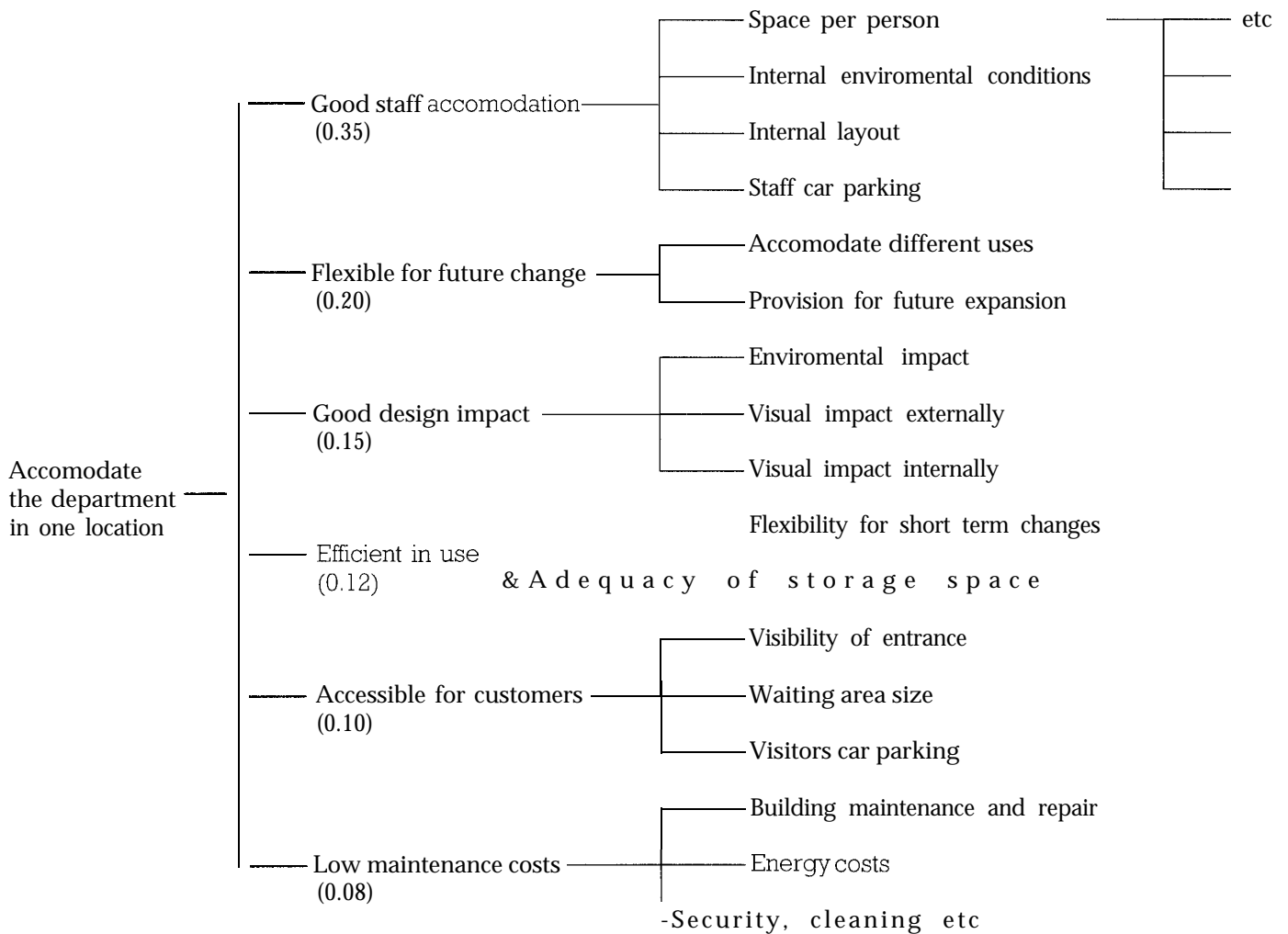
3.10 An example of an "objectives hierarchy" is at figure 3. It shows individual stakeholders how their objectives and needs sit within a wider framework. The primary objective is at the highest level with more detailed objectives shown at progressively lower levels. It is important to stress that the aim is to produce a priority listing, not simply to drop lesser priorities. The latter may result if consensus can be reached but it should not be the intention. Reducing the list runs the risk of having to reintroduce priorities at a later stage with all their associated detrimental impacts on cost, time and quality. **VM aims to eradicate the need for late changes, it should not encourage them.**

3.11 The first review should result in

- confirmation that a project is needed;
- a description of the project ie what has to be done to satisfy the objectives and priorities;
- a statement of the primary objective;
- a 'hierarchy' of project priorities;
- a favoured option(s) for further development; and
- a decision to proceed.

This balanced statement of need, objectives and priorities, agreed by all stakeholders, helps the project sponsor produce the project brief. The approach in this guidance emphasises that there should be a consensus among key stakeholders.

Figure 3 Example of Objectives Hierarchy Showing Weightings



Selecting the best approach: the second review

3.12 The second review should help ensure that the option finally selected will meet the objectives set for it

3.13 Following the key steps in the job plan (Annex C) the aim is to:

- review the validity of the objectives hierarchy with stakeholders and agree modifications
- evaluate the feasibility of options identified;
- examine the most promising option to see if it can be improved further;
- develop an agreed recommendation about the most valuable option which can form the basis of an agreed project brief; and
- produce a programme for developing the project.

3.14 Different options will have advantages and disadvantages when evaluated against objectives. Though the objectives hierarchy will help judge their relative value it will not provide all the answers.

3.15 An arithmetic weighting is often used to help with decisions. This involves the techniques of criteria weighting and matrix analysis. Examples of weightings

are shown in figure 3. Proposals are scored and 'weighted' and an aggregate calculated. The 'scores' should be agreed by key stakeholders. An example is shown at figure 4. **This arithmetic approach should not be used too rigidly. It is simply a tool to aid decision-making.**

3.16 The second review is concerned with the means of achieving project objectives as well as the objectives themselves. The project sponsor should therefore ensure a balanced representation between stakeholders and the project team.

3.17 The second review should result in:

- a clear statement of the processes to be provided and/or accommodated;
- a preferred outline design proposal; and
- the basis of a case for the continuation of design development.

3.18 The success of VM depends primarily on the ability to structure project objectives into a hierarchy which is acceptable to key stakeholders. Achieving value for money and consensus is the goal.

Figure 4 Example of analysis matrix

| Design Option <i>for example</i> | Objectives / Criteria <i>for example</i> | | | | | | | Total weighted score | Rank |
|-------------------------------------|---|-------------|---------------|------------|---------------|-------------|-----|----------------------|------|
| | Accommodation | Flexibility | Design impact | Efficiency | Accessibility | Maintenance | etc | | |
| | <i>Relative importance of attribute ('weight' from objectives hierarchy)</i> | | | | | | | | |
| | 0.35 | 0.20 | 0.15 | 0.12 | 0.10 | 0.08 | | | |
| Option A | 4 x 0.35 | 5 x 0.20 | etc | | | | | | |
| Option B | | | | | | | | | |
| Option C | | | | | | | | | |
| etc | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

- 1 = Poor
- 2 = Fair
- 3 = Good
- 4 = Very good
- 5 = Excellent

Method Each option is scored against each criteria and the score multiplied by the respective criteria weight. Scores are tallied horizontally. Options are then ranked in terms of their total weighted score.

4. ACHIEVING OPTIMUM VALUE

Key objectives

4.1 VM reviews during design development (often called value engineering at this stage) are primarily concerned with the most effective means of implementing the project. The emphasis is therefore more on managing the efforts of the project team and thoroughly reviewing all key design decisions to ensure that:

- the design is developed in line with the project brief;
- project needs and objectives are being achieved; and
- all key aspects of the design are effective and appropriate to achieve best value for money.

It should be emphasised that VM is not about finding fault but a tool to be used to enhance the value of designs.

Planning for Value Management during design development.

4.2 The project sponsor must ensure that reviews are planned well in advance and timed to coincide with key design milestones. It is equally important to ensure that, though planned, these reviews are not seen as a 'safety net' to rectify earlier shortcomings in design.

4.3 The key to this - as during project definition - is for the project sponsor to promote a continuous "value" culture so that the best value for money design is developed. This requires a questioning approach, where proposals and assumptions are continuously challenged to see whether the needs can be met more

efficiently, at the same or better quality, at improved cost or buildability. The first solution which seems to fit does not always turn out to be the best one.

Appraising the developing design: the third review

4.4 As the project progresses into final sketch plan stage, the project sponsor and value manager should review the VM plan and update it as necessary. Most works projects will benefit considerably from a third review when some 10-30 per cent of the design work is complete. This should:

- review project requirements and the objectives hierarchy agreed at the last review;
- check that key design decisions taken since the last review remain relevant to the objectives hierarchy and priorities;
- review key decisions against the project brief by brainstorming to identify ways of improving design proposals outlined to date and to identify options;
- evaluate the options in order to identify the most valuable one;
- develop the most valuable option to enhance value focusing on and resolving any perceived problems; and
- agree a statement of the option to be taken forward and agree a plan for the continued development of the design

Issues of buildability, safety, operation and maintenance should be considered during all VM reviews and evaluation of options.

4.5 It is important at this stage that VM reviews concentrate on key decisions and that effort is focused where it will be most effective. The main benefit of this approach is that important features of the design can be considered together against the background of project needs, priorities and the objectives hierarchy developed at earlier reviews. Using the objectives hierarchy will identify those with greatest value.

4.6 By reviewing design proposals in this way, the value manager encourages participants to question the significant features of the design, asking:

- what is it?
- what does it do?
- what does it cost?
- how valuable is it?
- what else could do it?
- what will that cost?

In this way participants are prepared for a creative brainstorming session to identify ways of improving the solutions proposed, or to develop other options. Annex F gives examples of such reviews,

4.7 The third review should result in:

- a thorough evaluation of the sketch design;
- clear recommendations for the finalisation of the sketch design; and
- the basis of a submission for final approval to implement the project.

4.8 For large and complex projects, or where different elements are designed and built in a phased sequence, it may be useful to have a further series of reviews, each focused on individual elements.

Concurrent studies

4.9 Concurrent studies are short meetings/workshops held to review key design decisions as the design process continues. They are particularly useful on management-type contracts where the design of specific work packages is staggered and overlaps with construction,

4.10 Concurrent studies can be very valuable because there is potential for significant improvement in value for money during detailed design. They provide a tangible means of promoting a continuous VM approach throughout the design process. These studies should concentrate on a small number of key elements of the design and should form part of the design programme. However, it is important to ensure that individual elements or components of the design are not evaluated in isolation causing adverse affects on other areas of the design

Contractors' change proposals

4.11 Contractors' change proposals can be submitted with their tenders but are usually post tender. They are primarily intended to reduce construction costs or improve buildability and are often linked to an incentive scheme which rewards the contractor for savings achieved.

4.12 The contractor's (and specialist sub-contractor's) construction-know-how is a valuable resource. If the contractor(s) are appointed early, it is possible to use their expertise during reviews to improve buildability so that the works are implemented faster, more efficiently and at lower cost. In any event, contractor(s) may be able to identify ways of improving the works and/or reducing cost during the detailed design and construction stages.

4.13 Government contracts such as GC Works/1 provide incentives for contractors to identify 'change proposals' which offer the potential for cost reduction. It is important to ensure that the quality and maintainability of the works will not suffer as a consequence. The project team may have to investigate and verify the feasibility of significant changes and the cost savings claimed. Before implementation, the project sponsor should ensure that a careful investigation of the contractor's change proposals, the likely resultant savings or improvements and the costs and programme implications of including them is fully undertaken. The project sponsor should ensure contractors' change proposals do not delay the work or cause other contractors additional work.

5. WHO TO INVOLVE

The value manager

5.1 Project sponsors must establish a structure for ongoing VM throughout the project and the appointment of an experienced value manager will help get the most from the process. For example, this person can be the project sponsor's professional adviser, project manager or construction manager (guidance no 33 (Revised)). Figure 5 gives an indication of the key activities and personnel involved but this may vary depending on the chosen contract strategy (see guidance no 36). If project or construction managers are used, project sponsors should ensure that they have the necessary VM skills prior to their appointment.

5.2 Whoever is responsible for VM should have a thorough knowledge of and experience in the relevant methods, activities and techniques. In particular, they must be able to demonstrate that they can facilitate reviews at key stages in project development. This will require competence in a range of management and interpersonal skills, including:

- the organisation and management of group discussions, brainstorming sessions and workshops;
- communication with technical and lay project participants;
- the ability to challenge project participant's assumptions about needs and approaches;
- motivation of project participants towards achieving project objectives;
- the analysis of complex problems;
- the ability to seek innovative solutions to project needs and
- leadership and authority.

Figure5 Key activities and personnel involved

| | Option appraisal Business case | Outline design | Final sketch plan | Detail design | Construction | Handover Occupation |
|--------------------|--|---|--|--|---|---|
| Key activity | Define project needs | Define project approach | Developing the design | Developing the detailed design | Construction | Project Evaluation |
| Review | 1st Review | 2nd Review | 3rd Review | Concurrent Studies | Contractor's Change Proposals | Post project |
| Personnel involved | Project Sponsor Departmental stakeholders/users Professional adviser / value manager | Project Sponsor Departmental stakeholders Professional adviser / value manager / project manager / Project team | Project Sponsor Professional adviser / value manager / project manager / Project team Contractor(s) (if appointed) | Project sponsor Professional adviser / value manager / project manager / Project team Contractor(s) (if appointed) | Project sponsor Professional adviser / value manager / project manager / Project team Contractor(s) | Project Sponsor / Departmental stakeholders / users / others as appropriate |

5.3 The value manager's role during brainstorming is primarily to facilitate and manage the process. Whilst ideas will come from the participants, the value manager can provide important stimulus and momentum to the group when ideas 'run dry'. It is particularly important to recognise - and to be able to overcome - the potential blocks on innovative ideas which can arise. Where these are due to the unwillingness of either individual participants or groups to participate actively in brainstorming, the value manager's interpersonal skills will be vital to establishing an open forum where all participants' contributions are valued equally.

The project team

5.4 On large and complex projects it is advisable to appoint a separate value manager. Generally, on other projects, the project team and in particular the project manager appointed to undertake the works should be responsible for VM. The advantages of using the project team include:

- familiarity with the project;
- achieving a deeper understanding of the project by reviewing it in a structured manner; and
- working together towards a common goal and, in the process, consolidating their team 'spirit' and effectiveness.

The main **disadvantages** are that the project team:

- may not be able to appraise their own work critically;
- may** not be able to introduce truly fresh and innovative ideas; and
- are more likely than an independent team to confirm that their original approach is the most effective one.

To overcome these difficulties does not necessarily require the appointment of an external team. The project sponsor can involve more senior personnel from the project team who, quite quickly, can review the work of the project's specific participants,

An external team

5.5 On the other hand, it may be appropriate to carry out an objective appraisal of the developing design, particularly at the third review. This can be done by using an external team, with the relevant design and technical expertise, to review the project. This is particularly relevant on complex projects. Alternatively, external expertise can be introduced into reviews by appointing a small number of key experts rather than a full and separate team.

5.6 The main **advantages** of an external team are:

- fresh ideas are generated; and
- the design can be critically appraised without having to defend existing ideas/approaches.

The main **disadvantages** include:

- conflict arising between the external and project teams;
- existing relationships, (on which the success of the project will depend) between the project sponsor and project team may be damaged;
- the project team may be unwilling to implement the external team's proposals;
- the external team may feel they must find cost savings to 'justify their appointment and fee;
- the ownership of - and, more importantly, liability for - design ideas may be unclear (paragraph 5.7);
- the external team may experience a difficult 'learning curve';
- the design process may be disrupted and/or delayed while the external team review the design;
- the sponsor pays for both the project team and external team who go over much the same ground; and
- there may be insufficient time for the external team to assimilate all relevant project information and to produce and evaluate workable design solutions.

Design liability

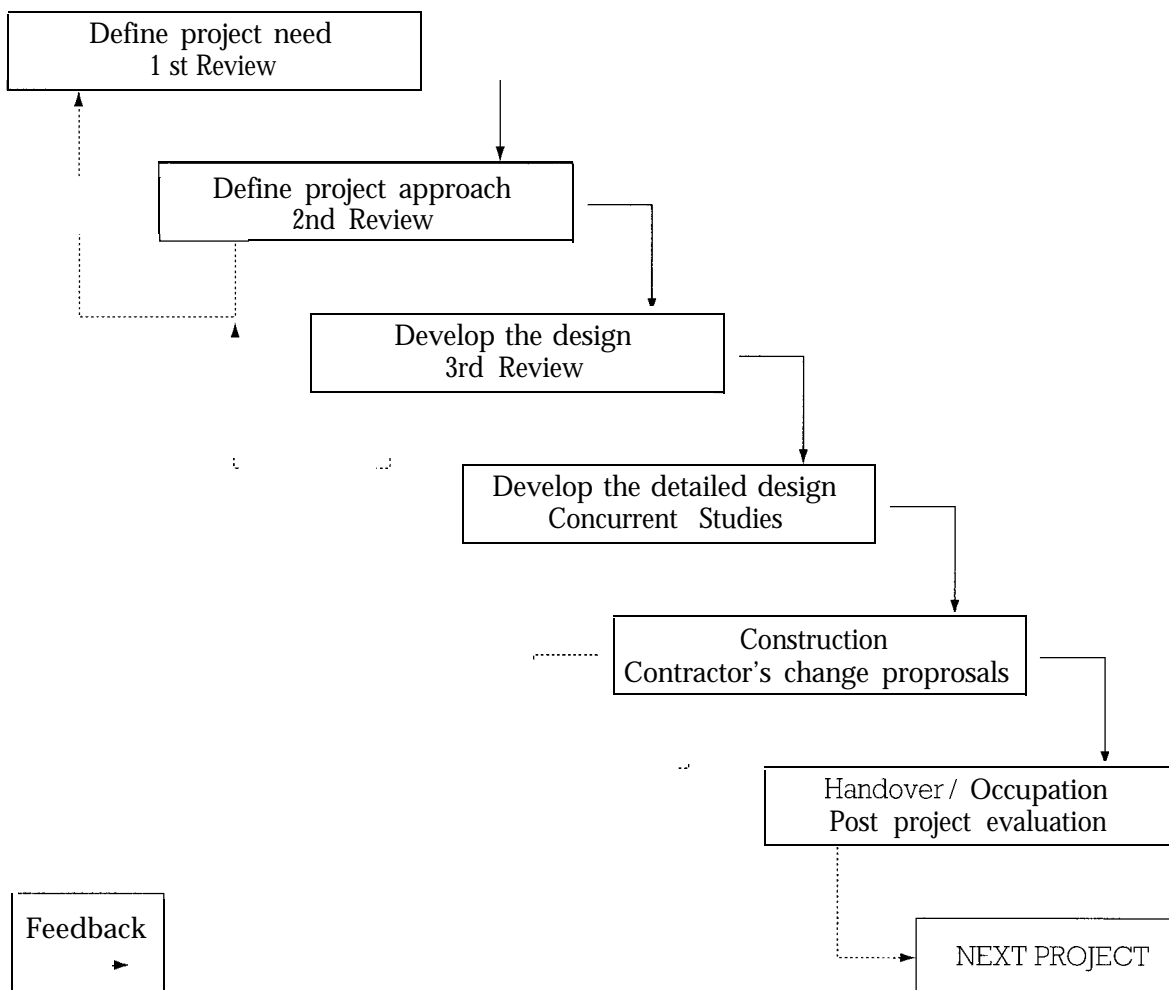
5.7 The use of an external team can cause confusion over design liability. The clearest approach is to place design liability firmly with the project manager or project team depending on how the relationships are structured (guidance no 36). The external team should make recommendations which the project team can either accept or reject. (While this may dilute the authority of the external team, it may be very difficult to force through changes against the wishes of the project team.)

5.8 These problems can be addressed by:

- pre-planning;
- ensuring the project team are aware of the intention to hold external reviews;
- including project team members in the process; and
- presenting proposals clearly and diplomatically.

5.9 Where an external team makes recommendations which require significant re-design, the project team may require additional remuneration for their implementation. In such circumstances, it would be acceptable to make such payments where the recommendations could not have been readily identified earlier. In this case the costs of re-design should be included as part of the option costs. VM is not a tool to get something for nothing from the project team.

Figure 6 Action and Feedback



Terms of appointment

5.10 Usually, from outline design, project managers undertake VM and this should be included in their terms of appointment. In addition, it is important to indicate to all potential project team members, prior to their appointment, that the proposed project will be subject to VM reviews and outline the proposed process. Key factors which firms will want to know when tendering include:

- the extent of their expected involvement;
- the number of reviews, their duration and timing;
- whether an external team is proposed;
- responsibilities and liabilities of workshop participants; and
- the extent of any proposed remuneration for design changes which are a direct result of the VM process.

6. ACTION AND FEEDBACK

Implementing recommendations for action

6.1 All reviews and studies should end with recommendations for modifications or for further design development. It is important that follow-up is planned to ensure that the accepted changes are made and a programme of design development work should be agreed with any future requirements or criteria for evaluation outlined (figure 6). The value manager must

ensure that this programme is followed and that the required outputs are produced.

6.2 Either during or after the third review, a follow-up meeting should confirm the project team's actions. It could, for example, be the next formal project team meeting. Any recommendations from the reviews are either:

- accepted;
- accepted, but with modifications agreed by the value manager;
- rejected: a good reason should be given and, if necessary, the project sponsor's agreement obtained; and
- earmarked for further study or development later in the design process.

6.3 The follow-up meeting will be particularly important when an external team has been used. In this case the value manager should explain to the project team the recommendations and how they were arrived at. Overcoming project team resistance to the external team's recommendations will be an important challenge for value managers and project sponsors. The project team must believe in the recommendations if they are to be implemented properly.

Feedback and project evaluation

6.4 If VM is to be developed and applied effectively, its practitioners and users must obtain feedback on its success. In some cases it will be possible to demonstrate the benefits of particular approaches immediately following implementation, eg in speed of construction, reduced costs or improved value. In other cases benefits may not be realised

immediately and must await project completion, handover and use,

6.5 Departments are aware of the requirements for **project evaluation** to demonstrate how project objectives were achieved and particular problems overcome. As part of the project evaluation process, project sponsors should establish whether:

- agreed objectives have been achieved;
- departments' priorities have been maintained;
- the project represents best value for money; and
- key design changes made as a result of VM have achieved the benefits expected of them.

6.6 The objective of project evaluation is for departments to learn from the process of sponsorship and improve future performance. This applies equally to everyone involved in the project. They should all be given feedback on the results of the evaluation. The object is to learn lessons not apportion blame.

6.1 While project evaluation can be carried out at any stage in the project cycle, a post-project evaluation will be of particular benefit to departments. This is because improvements in project value are only likely to be realised after it has been in use for a time. The user should be asked to comment on the success or otherwise of completed projects up to two years after occupation. Of particular interest here would be the degree to which the completed project matches users' key requirements. A review of the initial objectives should be made to consider how they have changed and how the project accommodated them. (See also guidance No 43 'Project Evaluations'.)

[JANUARY 1996]

ANNEX A

DEFINITIONS

| | |
|---|--|
| Concurrent studies: | structured reviews of detailed design proposals, undertaken by the project team in parallel with their design work, and led by the value manager. |
| Contractor's change proposals: | tender and post-tender design and/or construction changes suggested by the contractor and intended primarily to reduce costs or improve buildability. These changes are usually linked to an incentive scheme which rewards the contractor for savings achieved. |
| Criteria weighting: | the assignment of arithmetic weights to different project criteria to reflect their relative importance. |
| Functional analysis: | a technique designed to help in the appraisal of value by a careful analysis of function, ie the fundamental reason why the project element or component exists or is being designed. |
| Functional Analysis System Technique (FAST): | a form of functional analysis expressed in diagrammatic form to show the relationship between functions and the means of achieving them. |
| Job plan: | a logical and sequential approach to problem solving, which involves the identification and appraisal of a range of options, broken down into its constituent steps and used as the basis of the VM approach. |
| Matrix analysis: | a technique for the evaluation of options where scores are awarded for each option against key criteria. These scores are then multiplied by the appropriate <i>criteria weights</i> and total weighted scores for each option are examined to identify which offers best value for money. |
| Objectives hierarchy: | a breakdown of the primary objective into successively lower levels of sub-objectives until all the project objectives have been accounted for. Sub-objectives may be ranked and weighted as for criteria weighting. |
| Stakeholders: | investors, end-users and others with a real interest in the project outcome |

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ANNEX C

The Job Plan

A structured approach is required if the needs for projects are to be clearly examined and best solutions identified. The most effective means of doing this is to adopt a rational approach to decision making in which:

- the requirement is defined;
- different options for resolving the requirement are identified;
- options are evaluated; and
- the option(s) with the greatest potential is selected.

This is the essence of VM Practitioners have developed a systematic, logical and sequential means of doing this which they call the **job plan**. This uses option appraisal as the basis. As it is used to identify client needs as well as to appraise different means of achieving them, it provides the basis for a structured approach throughout the entire project process.

The seven key steps in the job plan are usually as follows:

- **Orientation:** identify what is to be achieved, what are the key project requirements, priorities and desirable characteristics.
- **Information:** gather relevant data about client needs, wants, values, costs, risks, timescale and other project constraints.
- **Speculation:** generate alternative options for the achievement of client needs within stated constraints.
- **Evaluation:** of the alternative options identified in the Speculation stage
- **Development:** of the most promising options and their more detailed appraisal.
- **Recommendation:** for action.
- **Implementation and Feedback:** examine how the recommendations were implemented to provide lessons for future projects.

The crucial element in the job plan is speculation. The worth of the approach is only really as good as the quality of ideas generated. All VM techniques emphasise the importance of creativity and imagination by brainstorming a range of possible solutions to the problem. Workshops - where people work together to identify alternative options - are a particularly good means of doing this. Workshops feature prominently in most approaches to VM.

BRIEF DESCRIPTION OF FUNCTIONAL ANALYSIS SYSTEM TECHNIQUE (FAST)**Functional Analysis**

Functional analysis is a technique designed to help the appraisal of value by a careful analysis of function, Its origins lie in the application of VM to the manufacturing process.

It provides a rigorous analysis of components which have a clearly defined functional role and is more applicable to the analysis of the detailed design of specific components (or elements) of a works project. It is somewhat less applicable to the identification of project needs at an early stage, when function cannot be defined so clearly. Nevertheless, the technique is closely related to the identification of a hierarchy of project objectives which is suggested in this guidance.

Functional analysis attempts to explore function by asking the initial question “What does it do?” This leads progressively to a series of ‘how’ questions, and the process is designed to identify alternative - and more valuable and/or cost effective - ways of achieving the key functional requirements of the component under review.

Functional Analysis System Technique (FAST)

FAST is a form of functional analysis and uses a ‘function diagram which identifies the basic or primary function (“what”) on the left hand side and progressively more detailed secondary function working from left to right until the means of achieving all these functions (“how”) are identified on the right hand side. The diagram can also answer the question of ‘why’ a particular part of the component exists, by reading from right to left. FAST is not a precise technique, but most practitioners insist that functions should be defined in terms of verb/noun combinations. This provides clarity and helps develop a shared understanding of the reason why components exist or are needed. While a FAST diagram may be read from right to left (as above), it is important to understand that it is not possible to find meaningful alternatives to a technical solution without first identifying the function required of it,

Functional cost analysis

As the FAST diagram progresses from left to right, it becomes more possible to assign costs to the different means of achieving a given function. This can help determine whether lower cost alternatives can be found. However, it is important that *all* functions required are clearly defined if costs of alternative solutions are to be compared in a meaningful way. It must be remembered also that it is very difficult to cost functions *per se*, costs relate more to the technical solutions proposed, and may be influenced by attributes of these solutions which are unrelated to the function required.

Using functional analysis

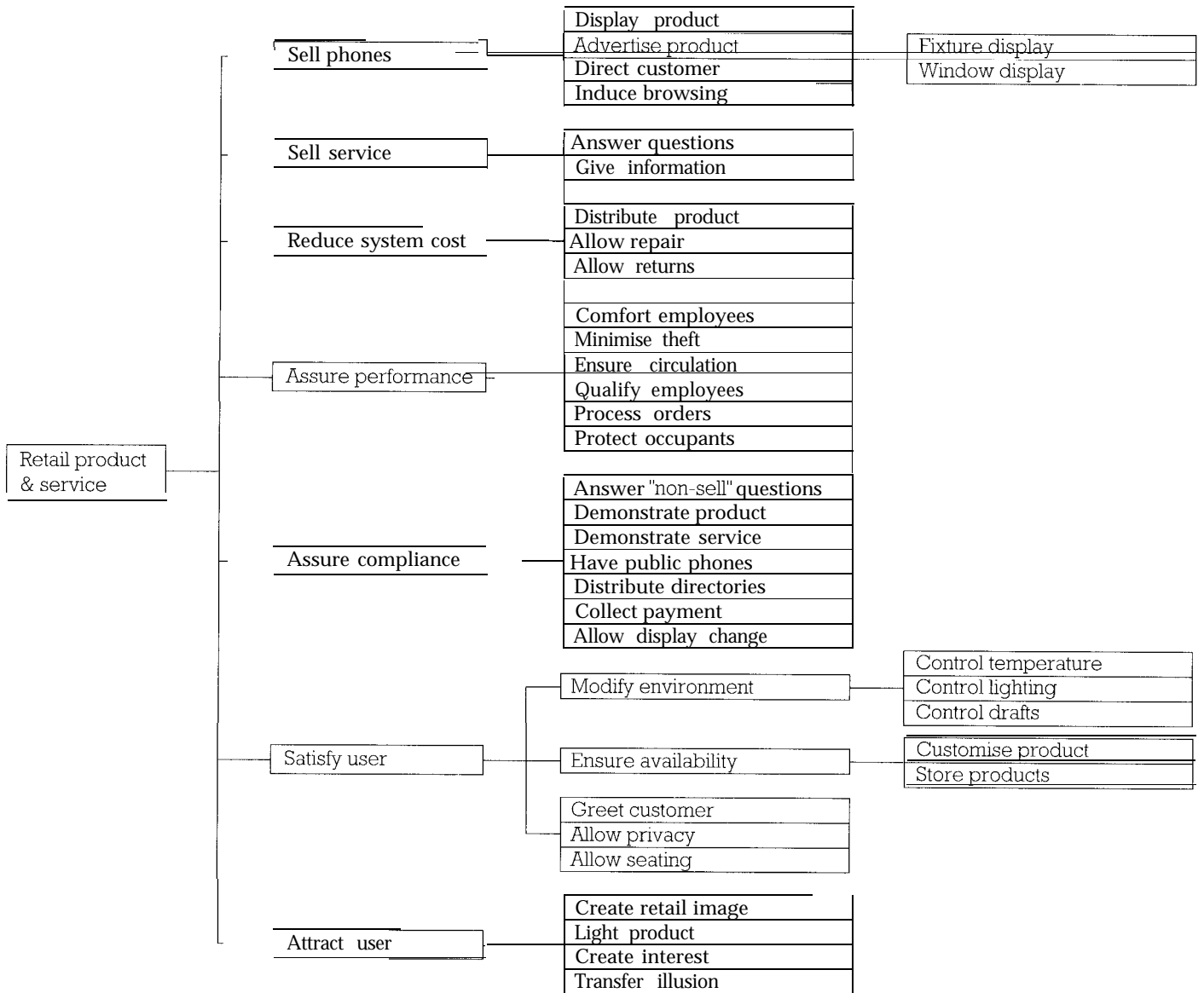
For most building components, a considerable range of secondary functions can be identified. This can lead to an over-complicated analysis. The value manager’s advice will be needed on the level of analysis required for particular functions. Additionally, the analysis should refer regularly to the primary function - a good deal of time can be wasted in attempting to solve problems which have little impact on the primary function, or are caused by a particular technical solution which has limited potential for development. The usefulness of FAST depends ultimately on the skill of the value manager in focusing on areas of greatest potential and in helping to define functions which suggest alternative solutions.

Figure D1- Fast Diagram

HOW? →

FUNCTIONAL ANALYSIS

← WHY?



ELEMENTS TO BE INCLUDED IN A LIFE CYCLE COSTING ANALYSIS

These will normally include:

Capital Costs

Land acquisition
Design team fees
Demolition & site preparation
Construction works
Statutory consents
Development Land Tax
Capital Gains Tax
Value Added Tax
Furnishings and Fittings
Commissioning work
Decanting charges

Finance Costs

Finance for land purchase

Finance for construction works

Finance during period of intended occupation

Operating Costs

Local Government charges
Insurance
Security and health
Management & administration
Energy
Cleaning
Internal & external landscaping

Maintenance, Replacement and Alteration Costs

External decorations
Internal decorations
Main structure and envelope
Finishes, fixtures and fittings
Plumbing and sanitary services
Heat source
Space heating and air treatment
Electrical installation
Gas installation
Lift and conveyor installation
Communications installation
Special & protective installation
External work

Residual Values

Resale value - building, land and equipment

Disposal costs - demolition, site clearance and disposal fees and charges

Capital Gains Tax and balancing charges

ANNEX F

REVIEW EXAMPLES

EXAMPLE ONE

The sketch design for the outside walls of an office building indicated the use of precast concrete cladding panels. An analysis of the design showed a total of 450 separate panels of 46 different types.

After a workshop review which included a cladding manufacturer, the total number of panels was reduced to 280 with only 21 different types to cover the same area. Although an increased cost arose due to the need for a larger crane to hoist the panels, the nett saving for the reduced number of moulds and perimeter waterproofing represented 10 per cent of the total cost of the cladding. The cladding element of the project amounted to 25 per cent of the project's cost, and as a result of the workshop review, the overall saving equated to 2.5 per cent of the project's capital cost.

EXAMPLE TWO

The detailed design of a bolt-on cladding system indicated an internal wall lining of insulation and painted plasterboard. Following a brainstorming session, the cladding manufacturer was asked to provide a price for incorporating the insulation and providing a metal self-finished panel on the inner face of the building. The plasterboard and its finish would be omitted.

The nett effect was to increase the cost of the project by £125,000. However, omitting the plasterboard and paint meant fewer "wet" trades on the project, saved three weeks on the overall construction period and increased the nett lettable floor area by 2 per cent. The "value" of the finished building was increased in the order of £2 million for an additional outlay of £125,000.

LIST OF RELEVANT CUP GUIDANCES

| | |
|--------------------|--|
| No 12 | Contracts and Contract Management for Construction Works |
| No 13 | The Selection and Appointment of Works Consultants |
| No 15 | Estimating for Works Projects |
| No 25 | Cost Management for Works Projects |
| No 26 (a & b) | Selection of Works Contractors |
| No 30 | Specification Writing |
| No 33 (Revised) | Project Sponsorship |
| No 35 | Life Cycle Costing |
| No 36 | Contract Strategy Selection for Major Projects |
| No 38 | Approval of Works Projects |
| No41 | Managing Risk and Contingency for Works Projects |
| No 43 | Project Evaluation |
| No 47 | Contract Management |
| No 52 | Programming and Progress Monitoring for Works Projects |