

4. Best Practice Maintenance Management for Listed Buildings

4.1 Introduction

To date there has been little examination of what would constitute a best practice approach to the maintenance management of listed buildings. The aim of this part of the research was to identify the features of a best practice approach for the maintenance of listed buildings.

4.2 Methodology

Two methods were employed in this research in order to try and identify elements of a best practice approach to the maintenance management of listed buildings.

4.2.1 Literature review

Both conservation and general maintenance management literature were reviewed in order to identify key issues and recent research which were applicable to best practice for the maintenance management of listed buildings.

4.2.2 Illustrations of maintenance management good practice from three non-heritage sector organisations

An empirical study of three non-heritage sector organisations (a housing association; an NHS hospital trust; a commercial financial institution) was carried out in order to illustrate examples of current maintenance management practice from the non-heritage sector. The study comprised interviews with a senior manager in each organisation together with an examination of maintenance documentation including handbooks and published policy.

4.3 Literature review

4.3.1 Introduction

This review summarises key issues and recent research which are applicable to best practice for the maintenance management of historic buildings. Two main groups of literature are relevant to this: that on conservation; and the general literature on maintenance and its management. Section 4.3.3 focuses on the general literature, whilst Section 4.3.4 concentrates on the literature particularly relevant to historic buildings and ‘mixed’ estates (stock which is mostly non-historic, but includes some historic buildings). The output from this review will be an identification of the key themes that emerge from the literature.

The conservation literature may be divided into three groups. Most of the literature tends to fall into two of these groups, namely: the philosophy and principles of conservation; and, the detail of how specific historic fabric should be recorded, conserved and maintained. The third group is much smaller, having emerged relatively recently, it relates to the management of conservation and its processes. This review will focus on the first and third of these groups. The connections between these areas of conservation are rarely explicit in the published material, hence Section 4.3.5 of this review will identify gaps in the literature.

The general maintenance management literature has tended in recent years to move from focusing on maximising the physical condition of buildings, to a facilities management perspective. The latter uses corporate objectives as the starting point, focuses on users, customers and other stakeholders, and considers how built assets are able to support the 'core business'. In part this mirrors an attempt to move away from the view that maintenance management is a reactive, low status operational service, to a perspective which sees maintenance management as more strategic, pro-active and integrated. These changes are reflected in the literature on maintenance, particularly in the public sector. It is worth noting at the outset that the literature dealing with general maintenance management (particularly with regard to good practice guidance) refers mainly to the public sector.

For the purposes of this review we discuss 'historic' buildings, rather than 'listed' buildings (the latter are the focus of the overall research project), as the literature tends to refer generically to historic, rather than listed, buildings.

The next section reviews definitions of maintenance found in the literature, it will be seen that there is some variety in these definitions; hence the definition used in this research project is given below as a reference point:

For the purposes of the research, maintenance was defined as, day-to-day activities such as cleaning, painting and minor repair relating to elements of a building. Maintenance seeks to extend the life of such elements and hence the entire building.

4.3.2 Definitions and principles of maintenance

4.3.2.1 Conservation literature

Definitions of Maintenance in the Conservation Literature

Maintenance means the continuous protective care of the fabric, contents and setting of a place, and is to be distinguished from repair. Repair involves restoration or reconstruction and it should be treated accordingly (ICOMOS, 1987 Article 1)

Maintenance includes all practical and technical measures that are needed to keep the site in condition at a standard that permits enjoyment of the cultural resource without damage. It is a continuous process. (Feilden and Jokilehto, 1993 p3).

Routine work necessary to keep the fabric of a building, the moving parts of machinery, grounds, gardens or any other artefact, in good order. (BS 7913:1998 p3)

It can be seen from these definitions that some conservation literature is clear about the distinction between maintenance and repair (ICOMOS, 1987); other guidance (Feilden and Jokilheto, 1993, and BS 7913: 1998) defines maintenance more broadly to include some repair.

Maintenance in the general literature goes further, and often implies improvement. Wordsworth (2001 p11), although writing principally about generic maintenance management, comments on this aspect in relation to historic buildings:

Maintenance in this context [conservation of historic buildings] may be taken literally, as an alternative to 'improvement' rather than an adjunct.

The rationale for a different approach to the maintenance of historic buildings is rooted in debates about their nature and value. Arguably the clearest expression of the particular values embodied in historic buildings is found in the Burra Charter (ICOMOS, 1987 Article 1). This holds that the fabric of historic buildings has cultural significance, that is, the building itself is an artefact. Hence, the conservation aim of maximising the retention of cultural significance is advocated, and the principle of minimal intervention ('do as much as necessary, as little as possible') is promoted. The Burra Charter (ICOMOS, 1987, Article 1.5) suggests where 'cultural significance' is identified, maintenance should be the first priority. It defines maintenance as:

...the continuous protective care of the fabric and setting of a place and is to be distinguished from repair because repair involves restoration or reconstruction.

Semple Kerr (1996 p39) also explicitly recognises the pre-eminence of maintenance as a conservation process:

Maintenance is the single most important conservation process. Whether the place is architectural, mechanical or botanical, prevention is better than cure.

Furthermore, Dann and Worthing (1999) argue that in an historic building context, the terms maintenance and repair cannot be as interchangeable as they might be for other building types. Whilst repair, may prolong the life of the element/component (and hence the building), and may, therefore, be necessary for the long-term protection of significance; it will also involve damage to the fabric. Although Brereton (1991 p8) does not argue against repair per se, he makes the point that

The unnecessary replacement of historic fabric, no matter how carefully the work is carried out, will have an adverse effect on the appearance of a building or monument, will seriously diminish its authenticity, and will significantly reduce its value as a source of historical information.

Feilden (1982 p8) suggests that the process of conservation encompasses seven degrees of intervention. He suggests, however, that decisions about the degree of intervention should be informed by conservation principles and, in particular, the notion that '...minimal effective intervention is always the best'.

Although the conservation literature may not be consistent about the extent to which repair activity is an acceptable part of the maintenance of historic buildings, there is much broader agreement about the two key principles that should guide the management of maintenance and repair:

- the conservation of cultural significance;
- minimal intervention.

There are also other, less fundamental, principles which are commonly accepted, these include:

- using like-for-like materials and methods of construction;
- being 'honest' about the nature of the intervention i.e. making no attempt to disguise or artificially age the work;
- the importance of information and recording in order to anticipate maintenance need.

4.3.2.2 General maintenance literature

The general maintenance literature provides a number of different definitions of maintenance (see box below), including those given in the relevant British Standards:

Definitions of Maintenance from the General Maintenance Literature

...the combination of all technical and associated administrative actions to retain an item or restore it to a state in which it can perform its required function” (BS3811:1974 p1)

...work, other than daily and routine cleaning, necessary to maintain the performance of the building fabric and its services. (BS 8210:1986 p2)

Work undertaken in order to keep, restore or improve every facility, i.e. every part of a building, its services and surrounds, to an agreed standard determined by the balance between the need and the available resources (Chartered Institute of Building, 1990 p7)

As noted above, there is often an element of *improvement* to maintenance discussed in the general literature, which is different to concepts in the conservation literature. Similarly (and unsurprisingly), minimal intervention does not feature as a guiding principle for general maintenance.

One aspect which emerges from definitions in both types of literature, however, is that maintenance is not simply a series of technological or craft activities, but also requires considerable administrative and managerial expertise.

An element of some of these definitions is that maintenance is about keeping a building functioning and that there is a balance to be struck between performance and resource inputs. This implies that management of maintenance involves determining a series of relative priorities. The setting of standards is also clearly identified as a requirement for the delivery of maintenance appropriate to the organisation for which it is being undertaken.

4.3.3 Best practice for the management of maintenance: general

This section summarises the best practice for generic building maintenance management, the four key sources identified are:

- British Standards Institute (1986) *BS8210: Building Maintenance Management*, London: BSI;
- The RICS Building Maintenance Panel (2000). *Building Maintenance: Strategy, Planning and Procurement*, Coventry: RICS Books;
- The Chartered Institute of Building (1990) *Maintenance Management: A Guide to Good Practice* Ascot: CIOB;
- Wordsworth, P (2001) *Lee's Building Maintenance Management* 4th ed., Oxford: Blackwell Science.

Best practice guidance on general building maintenance management that emerges from the literature, may be divided into the following areas:

- aims and objectives (related to maintenance strategy/policy);
- processes and procedures (for maintenance implementation);
- risk management;
- programmes and prioritisation;
- condition surveys, inspections, and stock data;
- information management;
- staff expertise and training;
- financial management and performance measurement.

Best practice is discussed under these headings in the remainder of Section 4.3.3, and the same structure, with minor modifications, is followed for Section 4.3.4, which relates to historic buildings and ‘mixed’ estates.

4.3.3.1 Aims and Objectives (related to maintenance strategy/policy)

In some best practice guidance the requirement for clear aims and objectives is implicit, rather than explicit. Other sources refer to two levels of maintenance activity: at a strategic level, describing aims and objectives for the management of maintenance; and at an operational level related to the procedures for the implementation of maintenance. The former is discussed here and the latter in Section 4.3.3.2.

The terms ‘policy’ and ‘strategy’ are not always clearly delineated in the literature. Hence, the British Standard, BS 3811:1974 Glossary of Maintenance Terms in Terotechnology (p3), defines a maintenance policy as a: ‘Strategy within which decisions on maintenance are taken. Wordsworth (2001 p15), however, sees maintenance policy as the mechanism which *operationalises* strategy. Because of this confusion, for the purposes of this review the composite term strategy/policy will be used.

It could be argued that the maintenance strategy/policy should address all the areas listed above, but several sources identify key components of a maintenance strategy/policy as follows:

- The maintenance strategy/policy should be related to overall organisational goals and environmental policies: ‘...the maintenance policy should integrate with the wider mission statement and management policies of the client.’ (RICS 2000 p6). Hence, it should be related to such issues as current and projected functional requirements, the suitability of built assets for their intended uses, and hence the required ‘life’ of the asset.

A building maintenance policy should be a clear statement of the objectives and the methods to be employed in keeping buildings fit for use and in preserving their asset value. It should define the framework on which all building maintenance and management operations are based and state the life and life expectancy of the asset. (RICS, 2000 p6)

- With regard to the issue of life expectancy, some literature concerning the public sector recognises the impact of long-term maintenance for owner occupied buildings, and links this to flexibility, or the lack of it, within the estate (Department for Education and Skills 2000; HEFCE, 2000). Within the strategy/policy, however there should be a recognition that built assets are a resource in themselves, as BS 8210:1986, p4 states: ‘Buildings may be included in a property portfolio from which a financial return is required.’
- Legal considerations and responsibilities should form part of the maintenance strategy/policy. The most recent RICS guidance (2000) and Wordsworth (2001) provide a comprehensive list of relevant statutes.
- The maintenance strategy/policy should identify appropriate standards. The CIOB guidance suggests that there are both quality standards and service standards, and Wordsworth (2001) devotes an entire chapter to standards in maintenance. An associated issue is that of the measurement of performance.

4.3.3.2 Processes and procedures (for maintenance implementation)

Both the CIOB (1990) and the RICS (2000) make it clear that having established a strategy/set of appropriate policies, a coherent set of procedures needs to be developed in order to operationalise maintenance. The RICS (2000 p 9-12) suggests the adoption of procedures that:

- explain the intended organisation for maintenance. This might include:
 - the degree of in-house or external staff required for the management of maintenance;
 - the use of in-house or external contractors for building works;
 - maintenance programmes (see below);
 - the means by which maintenance need will be identified and prioritised;
 - health and safety issues.
- explain the intended procurement of maintenance works and the services of external consultants.
- provide for periodic monitoring and feedback of progress. This might include:
 - reporting to the management board;
 - formal quality measurement methods to be adopted (many of these are a sector specific requirement in the public sector);
 - bench-marking arrangements (the RICS suggests that this technique is a valuable tool for measuring relative performance);
 - backlog maintenance; recording deferred or unrecognised maintenance need.

The CIOB (1990 p18) suggests a list of questions that need to be answered:

What is required to be done?
Which items are the most important?
What are the legal requirements?
When can the work be done without loss of production or facilities or service?
How often should inspections, surveys, tests and works be carried out?
Where is the money coming from?

The RICS (2000) addresses all of these questions and adds another question concerning priorities: ‘What works are the most necessary, if funds may not cover all of the work identified?’

4.3.3.3 Risk management

Increasingly, the literature also refers to risk management techniques. Such techniques are used to focus on the effect of a potential fabric failure on the objectives of the organisation and not simply the effects on the fabric itself (Wordsworth 2001).

In the general literature risk has become increasingly important as a result of a move towards a facilities management perspective and as organisations focus on cost efficiency. There are a number of factors which have led to an increase in the use of risk management techniques for the management of built assets; these include greater accountability (to stakeholders or shareholders) and the resultant requirement to create greater transparency. The risk management process is also important in terms of legal liability and, in some cases, insurance and links to the effect of the condition of the fabric on building users and wider corporate goals. For example, an NHS document on developing an estate strategy (NHS Estates 1999) clearly identifies as 'significant risks' the possible negative impact of building condition on such issues as infection control and managing medical devices.

Greater efforts to quantify risks has resulted in interest in 'risk transfer'. This is recognised in the literature as one of the drivers behind the adoption of Private Finance Initiative (PFI) schemes. The effect of some PFI/PPP schemes, the 'build and maintain' ones in particular, is that a longer-term view of maintenance is taken, increasing the importance of a planned approach to maintenance. However the effect is to focus attention only on the period of the agreement, at the possible detriment of even longer-term issues (HEFCE, 1998). The recognition of risks associated with component failure has resulted in published component life data, but this is, necessarily, generic. Hence there is recognition that local knowledge of component lives in a particular group of buildings is more useful in informing decision making for repair and replacement. The remaining life of a component will be influenced by the nature and quality of the maintenance regime. One insurance scheme for housing recognises this in relating component lives directly to specific preventative maintenance routines (cleaning, oiling, painting, etc.) (HAPM 1992). Some doubts have been expressed about the usefulness, in practice, of such schemes, because of the difficulties in satisfying these maintenance requirements (Marshall, 1996).

Another aspect associated with risk, is uncertainty in the wider context; technical innovation, statutory requirements, political change (particularly for the public sector), and changes in the socio-economic climate (private and public sector). Such uncertainty can bring into question the rationale for the management of built assets and even the existence of the organisation. (Wood, 2003).

4.3.3.4 Programmes and prioritisation

Linked to the general definition of the term 'maintenance' is the distinction that is made between the two broad types of maintenance action; 'reactive' ('day-to day' or 'corrective') maintenance and 'preventative' (or 'planned') maintenance. It should be noted that there is great inconsistency in the literature, both in the nomenclature used and in the management implications ascribed to each type of maintenance. The types of maintenance and how they are defined are discussed below.

Reactive maintenance is defined in most of the literature as maintenance intervention in response to a failure, where that failure is generally identified by a building user, rather than by the maintenance management team.

Planned maintenance programmes are seen, by the key good practice guides, as cost effective and efficient, in terms of both the financial and management costs. Planned maintenance is divided into 'condition independent' and 'condition dependent' maintenance (Holmes 1994)

'Condition independent' maintenance (frequently called cyclical maintenance), requires no pre-inspection and tends to be work that is undertaken at regular intervals (external painting, annual safety checks etc.). Condition independent maintenance has been defined as: 'intended to reduce the likelihood of the item not meeting an acceptable condition' (BS 3811 p2).

Condition dependent maintenance, on the other hand, occurs when an element or component is assessed (through an inspection or condition survey) and the maintenance manager subsequently prioritises the required maintenance/repair/replacement. It has been defined as:

...maintenance carried out with forethought, control and the use of records to a predetermined plan based on the results of previous condition surveys. (RICS, 1990 p6).

Where such intervention is carried out in time to avoid failure, it could be termed 'planned preventative' maintenance (condition independent maintenance may also be so designated). In practice, however, inspections/condition surveys also identify immediate remedial work necessary as a result of deterioration/failure that has already occurred.

Clearly there are different levels of planning and management for either type of planned maintenance. The more complex and demanding is condition dependent maintenance, as this requires continuous monitoring of the building fabric, good information management, and careful consideration of the relative priorities. Some texts (for example, Hedley and Wood 1995, and Wood 2003) suggest that planned maintenance programmes require frequent re-inspection to ensure that work can still be done prior to failure, but that it is not undertaken on elements/components that are in better condition than anticipated (this is often referred to as 'just-in-time' (JIT) maintenance). Such review also allows changes in functional requirements (expansion, retraction, changes in work processes, etc.) to be taken into account, thus minimising maintenance to buildings which have only a short functional life. Specific reference is also made to the need to reconsider the planned maintenance programme at the time that annual budgets are set, as part of a re-prioritisation exercise (RICS, 2000). The prerequisites of such a policy are: high quality information and information systems; an analysis of the relative 'value' of the buildings and their elements (which, for historic buildings would include the assessment of cultural significance); and an increased frequency of inspections

Even with an efficient planned maintenance programme, some form of user-initiated reactive ('response' or 'day-to day') maintenance is inevitable. This needs to be considered at both the strategic and operational stages, in terms of establishing response criteria, timing, procurement and recording. An over-reliance on response maintenance is described as costly, not just in terms of financial costs, but also with regard to the loss of function, the resultant disruption, and management efficiency. Good practice guidance in the public sector (for example, Audit Commission 1986a and 1986b, 1988 and 2002; Association of Metropolitan Authorities, 1988; HEFCE, 1998) advocates that, for reasons of equity, efficiency and effectiveness, the majority of the maintenance budget should be spent on planned maintenance (60 per cent or more), with a lesser amount on response maintenance (40 per cent or less). Criticism of this approach (Wood, 2003, Williams, 1994) contends that it may appear economic in the long-term, but, if the wider organisational and political context is one of uncertainty, then the use of risk analysis and a focus on the short term (response maintenance) is able to reduce immediate costs, give greater flexibility, and, should have the additional advantage of immediate 'customer' (user) satisfaction. (Wordsworth, 2001)

Wordsworth (2001 p98) defines programming as 'scheduling the manner in which maintenance work will be carried out'. He emphasises different timescales for programmes: long-term programmes (an expression of policy rather than a detailed scheduling of tasks); medium term programmes (on an annual basis), and short-term programmes (daily, weekly and monthly tasks).

The general maintenance literature has sought to describe the process of maintenance prioritisation. There is a recognition that wider issues (organisational, statutory, political, etc.) impact on programming, and hence that managers make decisions about priorities, based on technical information (for example, from inspections), but will also act intuitively, drawing on previous experience, and take a wide range of factors into account. Several attempts have been made to systematise this process (Qipeng Shen and Spedding, 1998 and Pitt, 1997). Such attempts, which rely on quantitative data and the application of a formula, inevitably include a limited number of easy-to-measure factors. Although useful as a supporting tool, they may give a spurious impression of accuracy, which could be misleading. This is because of the subjective nature of the choice of weighting, and the exclusion of difficult-to-measure qualitative factors, which are nonetheless important.

Some of the literature cites the increase in statutory requirements, particularly those related to health and safety, as resulting in little choice about which maintenance work is undertaken. The argument is that statutory requirements (which are always given the highest priority rating) are consuming all, or nearly all, the available budget (RICS, 2000). Non-statutory cyclical maintenance is also identified an easy target for budget cuts when resources are limited. This has been a significant contributing factor to the development of backlog maintenance in the public sector (Audit Commission, 1986a)

4.3.3.5 Condition surveys, inspections, and stock data

A common theme in the general maintenance management literature is that in order to achieve a coherent and effective service, comprehensive data on the nature and condition of the buildings is required (for example, CIOB, 1990; BS, 1986; RICS, 1990; RICS, 2000; Wordsworth 2001; Chanter and Swallow 1996). The most commonly identified method for the collection of such information is the stock condition survey. This is defined generally as a systematic survey of the fabric of a building, in order to produce accurate information of the condition, and an assessment of the extent and timing of future work (maintenance/repairs/replacement). Condition surveys provide maintenance managers with a snapshot of the condition of their stock and should enable the development of planned maintenance programmes, as well as the opportunity to consider the effectiveness of previous programmes (Wordsworth, 2001).

No specific frequency is considered ideal and most texts relate the frequency to the nature of the organisation, and the use and condition of the buildings. However a number of sources refer to a five year rolling programme of inspections, with 20 per cent of the stock inspected each year (RICS 1997, 2000). The British Standard (BS 8210, 1986 p9) on building maintenance management describes three frequencies:

- Routine; continuous regular observations by the building users...feedback from this type of observation should be encouraged;
- General; visual inspections of main elements...annually under supervision of suitably qualified personnel;
- Detailed; ...full inspection of the building fabric by suitably qualified personnel should not normally exceed a 5 year period.

Other sources echo the British Standard in identifying further opportunities to gather stock condition information through annual statutory inspections, unplanned maintenance works, and health and safety audits (RICS, 2000; Wordsworth, 2001; Chanter and Swallow 1996).

Wordsworth (2001 p69) refers to ‘...methods of measuring the compliance of buildings with their required performance standard’. He outlines seven types of condition survey, from broad-brush approaches, to detailed inspections, which identify specific shortcomings. Broad-brush condition surveys are usually used to inform financial planning for 5-10 years.

In the general literature there is some discussion regarding the cost effectiveness of using stratified samples of a buildings stock during a condition survey, rather than a 100 per cent sample (see Audit Commission, 2000; Day, 1998).

Given the range of potential uses of condition surveys, Marshall (1994) highlights the importance of commissioning organisations being clear about the purpose of a particular survey. He also suggests that appropriate data collection and storage are essential. Several authors have highlighted common problems with condition surveys (for example, Marshall, 1996; Chapman and Beck 1998):

- lack of clarity in the brief for the condition survey. This frequently results in too much information being gathered which actually inhibits the development of workable maintenance programmes;
- consultants producing inappropriately structured information, because they had not really understood the nature of the client's business;
- problems with the compilation of data and its subsequent manipulation. In particular, problems of the degree of integration of the database and the compatibility of different computer systems. Hence, difficulties may be caused in relation to linking information from the original condition survey with informal observations, other inspections and information on work subsequently undertaken.

There are a number of categories of condition, which have been devised by various bodies, for example the RICS (2000), which are widely used in condition surveys. These can inform the wider process of programming works and establishing a required level of performance.

4.3.3.6 Information management

Once the functional requirements, required building life, and standards have been established, the identification of maintenance need for a particular building necessitates analysis of information from a wide range of sources. According to Chanter and Swallow (1996) these will include:

- stock condition surveys;
- existing planned maintenance programmes;
- faults and repairs notified by building users;
- feedback from servicing, repair, and improvement works in progress;
- relevant legal requirements;
- existing building and service records.

The general literature describes the complex and varied nature of the information that is both produced and required for effective maintenance management (Wordsworth, 2001; BS 8210 1986). Systems that manage such information should also make provision for feedback and monitoring. It can be seen from the above list that there is a need to integrate information from various sources. A number of texts suggest an integrated property management database/system, which allows for the development of broader, more strategic, property management (Wordsworth, 2001; RICS 1990; RICS, 2000). The possibility of this has

improved with the development of information and communication technology, but the proliferation of different systems has militated against effective implementation. Furthermore, the range and variety of disciplines, organisational groups and individuals results in different values with regard to what they consider to be the necessary information and how it should be used.(Chanter and Swallow, 1996; Langston and Lauge-Kristensen, 2002)

With regard to key 'documents' for maintenance management, the general literature emphasises the importance of maintenance manuals, which provide the user with information on contacts, suppliers and important characteristics of the building, and which are updated when maintenance work is carried out (Blacker, 1994 and BS 8210:1986).

4.3.3.7 Staff expertise and training

The CIOB guide (1990) notes that maintenance activity will involve the management of a very wide range of different skills and professional input. Wordsworth comments that maintenance management requires skills of gathering, storing, and manipulating data and information. Barrett (1995) also notes that the maintenance management role requires good strategic management skills, as well as being able to deal with a wide range of tactical processes and related issues.

The literature suggests, that in order to be effective, managers should have a suitable specialist qualification as well as appropriate experience (CIOB, 1990 and Wordsworth, 2001). In the public sector literature the NHS Estates (2001) provides 'minimum', 'good' and 'better' practice advice on the extent of required training for maintenance operations. For example, the 'minimum' standard included technical training, induction (including health and safety), and 'front of house' skills training for all staff. The 'better' practice expands this to encompass locally developed National Vocational Qualifications (NVQs), or equivalent training programmes, and a recognised training programme in customer care.

In order to manage maintenance, existing and necessary skills should be mapped to determine which, if any, need to be procured from external sources (HEFCE, 1998).

4.3.3.8 Financial management and performance measurement

The literature tends to favour long-term budgeting for maintenance (3-5 years is most commonly mentioned), drawing on information from the organisation's condition survey (RICS 2000). This should allow the maintenance manager to consider strategically the implications of managing the maintenance workload over time (CIOB, 1990).

It is likely that the majority of maintenance budgets will be reviewed annually, however, and this provides an opportunity for a reconsideration of priorities previously established. The down side of annual maintenance budgeting is referred to in relation to the problems of dealing with overspends and/or under-spends and the short-term impact this has on the management of maintenance (CIOB, 1990; RICS, 2000).

The RICS (2000 p20) recommends that budgets are set in accordance with maintenance strategy/policy and the overall goals of the organisation. It warns that:

A budget prepared merely on the grounds of constructional condition or performance may not go far enough to serve its purpose.

In other words, there needs to be coherence between business strategy, maintenance strategy/policy, financial management and maintenance implementation.

The literature suggests that financial control through the careful and appropriate selection of procurement routes is good practice. (CIOB, 1990; RICS, 2000; Wordsworth, 2001). There are a range of contractual forms relevant to maintenance programmes and these are discussed in some detail in Wordsworth (2001) and the RICS (2000). The literature refers to lump sum contracts as being suitable for discrete projects of works which have been predicted, specified, and are not on-going in nature. Term contracts, on the other hand, are suitable where the variety and scope of work is repetitious, but the exact quantity is not known. They last for a specified term, and pricing is agreed on the basis of a pre-determined schedule of rates for the likely works to be undertaken. The RICS (2000) and Wordsworth (2001) discuss a third procurement route, suggesting that this is the subject of increasing interest and use. These are 'fixed cost' maintenance contracts (sometimes referred to as 'Service Level Agreements'), in which a level of maintenance service is specified and agreed to, for a fixed cost over the term of the contract. There is some suggestion that the use of such agreements could be considered to be best practice as they could form part of risk reduction strategies (both for the user of the building and the commissioning client), and partnering arrangements.

In the general maintenance literature there is considerable discussion about the means of evaluating performance, this discussion focuses on the development of performance indicators. In the public sector, in particular, key performance indicators have become a common tool for monitoring past performance and for the allocation of future budgets (for example, NHS Estates, 2000; Audit Commission, 2002; HEFCE, 1998). These performance indicators have certain characteristics in common, in particular, they are relatively easy to measure and cost focused. Hence indicators for maintenance that are often used are: the amount of backlog; costs per metre squared (or per user); and the speed of response (for reactive maintenance). There have been some attempts to measure more qualitative issues, for example by the Housing Corporation, in relation to 'customer' satisfaction (Housing Corporation, 2003), but the overwhelming majority of national indicators remains quantitative.

4.3.4 Best practice for the management of maintenance: historic buildings and 'mixed' estates

4.3.4.1 Corporate objectives and maintenance strategy/policy

Feilden and Jokilehto (1993) attempt to develop a coherent framework for strategic planning related to world cultural heritage sites. They highlight the interrelated nature of the management of complex heritage resources, and the dynamic contexts in which they exist (policy, and the wider political, economic, social, and statutory environments). They also stress the importance of identifying the value of a heritage asset as a precursor to any action, and thus they develop the notion of a management plan found in the Burra Charter (ICOMOS, 1987).

In the heritage sector in England, there has been a shift in focus in the last ten years from preservation to a concern with broader conservation issues including the management of change. Part of this comes from the notion of sustainability and in particular the idea of non-renewability and futurity (for example English Heritage, 1996 and 2000; Historic Scotland, 2000).

Since the publication of *Power of Place* (English Heritage, 2000) there is evidence of an increased awareness of the need for strategic approaches to the care of government-owned/managed historic buildings (English Heritage, 2003). This more strategic approach to the management of built cultural heritage has not generally been extended, however, to the management of maintenance.

One of the few documents in the conservation literature to link strategy and maintenance is the Australian New South Wales Government publication for public sector organisations, (New South Wales Government, 2001). This text applies general strategic management theories to heritage asset management. The adoption of a five-stage heritage asset management process is proposed. This comprises:

1. the identification of heritage assets;
2. the development of a strategic plan: integrating broader organisational objectives with heritage policies. This is linked to the development of a Conservation Plan which is integrated with other management plans such as an overall Asset Management Plan and a Capital Investment Strategic Plan;
3. the development of detailed plans for individual heritage items, the prioritisation of tasks and the preparation of a maintenance plan;
4. the implementation process (where specific resources are allocated and the plan is operationalised);
5. the review, evaluation, and revision, of the asset management process itself.

It can be seen that stages 2 and 3 link the management of maintenance and maintenance priorities to the conservation plan, and hence cultural significance.

As discussed in Section 4.3.3.1 above, the general maintenance literature gives much consideration to the strategic framework for maintenance. In the public sector, for example, where the organisational goals are more complex and there is a greater emphasis on accountability than the pursuit of profit, it is argued that day-to-day actions need to be justified in relation to a broader strategic framework. This is apparent in the different sectoral approaches to maintenance and repair issues within the public sector (HEFCE, 1998; NHS Estates, 1999; Audit Commission, 1986; Audit Commission, 1997; Audit Commission 2003), where building maintenance activity is related to the aims and objectives of the overall organisation.

The conservation literature emphasises a need to take a long-term interest in the maintenance of historic buildings. Feilden (1982 p218) states that

Historic buildings differ from new ones in that they are expected to last for ever – a definition of ‘for ever’ being ‘as long as it is wanted’. An historic building is one that for various reasons, society has decided shall be conserved for as long as possible.

The key here is that ‘society’ decides if the building is wanted, and the focus is on extending the physical life indefinitely. For non-historic buildings the length of interest is usually determined by the length of tenure, which is, in turn, linked to organisational goals and other functional requirements (as discussed in Section 4.3.3). Hence, for non-historic buildings the emphasis tends to be on functional life (which could be very short for dynamic, fast-changing businesses), and the importance of physical life is the effect that it has on function.

For historic buildings, the long-term requirement for maintenance has implications for the way in which such maintenance should be managed:

It is important to appreciate that the cost of maintaining and repairing an historic building is not usually great when measured over the life of the building. When substantial costs arise it is usually because there has been a period of neglect or poor management. (Government Historic Buildings Advisory Unit (GHBAU), 1998 Part C p1)

Heritage organisations are able to adopt this point of view for their maintenance strategies/policies because the physical estate is their 'core business'. For organisations with 'mixed' estates, however, the justification for expenditure will be in relation to functional life and a 'core business' which is separate from the buildings. For example, the Audit Commission (1999 p29) good practice recommendations regarding the estate suggest that key questions include:

What do we need this building for? How well does it contribute to core policing work?
What would be the impact if we did not have this building?

4.3.4.2 Management processes, conservation plans, and management plans

Because the process of maintenance management is affected by organisational structures, culture and decision-making protocols, there are particular issues in 'mixed' estates. In these situations the different philosophies relating to historic and non-historic buildings, have to be reconciled. Wordsworth (2001 p290), although writing a general text, refers to conservation, commenting that many maintenance managers may be '...baffled or dismayed at the ways in which too 'precious' an approach to conservation issues may interfere with the safe and economic running of a building.' goes on to propose the following framework for decision-making:

- the specific reasons for conserving all or part of a building (conservation philosophy);
- how and in what ways this will then affect its value and utility (concurrence and conflicts of interest);
- how the conflicts and benefits of the conservation process affect the use and management of the building as a whole (a framework for evaluating conservation);
- how the conservation will be carried out (sourcing skills and expertise).

There is relatively little about management processes in the conservation literature, but there is some good practice advice for government estates (most of which are, in the terms of this review, 'mixed'). This advice recommends the appointment of a senior manager to act as a designated conservation focal point (GHBAU, 1998). Such emphasis on seniority indicates a recognition of the role of organisational hierarchy in signalling importance, and is in contrast, as Feilden (1982 p226) noted, to the generally lowly status accorded to maintenance departments:

Building maintenance has unfortunately not been given the status it deserves. It has not been considered at a strategic level but only on an ad-hoc basis. Skilful management of building maintenance while respecting the principles of conservation is a high level occupation.

The Heritage Lottery Fund has supported the introduction of conservation plans in the UK (HLF, 1999). Historic Scotland (2000 p4) discusses the contents of a conservation plan and the process of its production:

Preparation of a conservation plan encourages those with responsibility for the site to think about it in a structured way, to assess how and why it is significant, and how it should be managed in order to conserve that cultural significance...A conservation plan must be a living document, having a clearly defined purpose, and which is used and updated as required. The preparation of a conservation plan must not be an end in itself, but be considered as a necessary management tool. A conservation plan should pay

dividends in the long term by providing a firm foundation for management and expenditure decisions

Although the conservation plan is not specifically about maintenance, it provides both a context and a reference point for strategic thinking on maintenance. An assessment of cultural significance and vulnerability (related to architectural qualities, construction features, physical/social context/surroundings, use and/or social development) is considered the starting point for developing a conservation plan (English Heritage, 1999 and 2001). Semple Kerr (1996 pp.25-26) suggests a two-stage process. The first stage is the establishment of the cultural significance and its vulnerability, together with a framework of policies for its future care, and the second stage is the implementation of these policies. He suggests the following categories provide a framework for this approach:

- basis of approach;
- control of change;
- provision of services and retention of character;
- specific elements;
- care of fabric;
- setting;
- management.

There is little in the conservation literature about the strategic role that could be played by conservation plans in informing estate strategies for portfolios of historic properties (rather than individual sites) and there is even less about 'mixed' estates. One exception is the recently published *Managing Local Authority Heritage Assets* from English Heritage (2003 c). Within this document a strategic approach to the management of heritage assets is emphasised and maintenance is given some prominence.

Management plans are related specifically to maintenance by English Heritage (2001 p66):

...management plans will place greater emphasis on the programme of work than the thinking behind it. Thus a management plan will normally include a specific schedule of maintenance work, often with costs.

However, there is little written about management plans as the vehicle for the implementation of conservation plans, particularly with regard to the co-ordination of the different activities affecting significance (maintenance, visitor management, interpretation, development, etc.).

The Government Historic Buildings Advisory Unit (GHBAU) proposes the use of a conservation manual as part of a system for 'proper care and management'. This conservation manual is a site-specific document, which is a guiding management tool for the implementation of maintenance. It draws on assessments of significance, and could be seen as a combination of conservation plan and management plan. The document suggests that interventions and the reasons for them should be recorded in the conservation manual (see Section 4.3.4.6 for a more detailed discussion of conservation manuals).

4.3.4.3 Risk management

Risk in the conservation literature tends to be discussed in the context of refurbishment and repair work, rather than related to maintenance management activities. This seems to result from the assumption that undertaking maintenance is non-negotiable. Feilden and Jokilehto (1993), however, do suggest that one advantage of a preventative maintenance programme is the potential reduction in the risk of damage from storms and other ‘natural’, events. More recently, the methodology for conservation plans (English Heritage, 1999) addresses the vulnerability of cultural significance, acknowledging that use and context need to be considered in relation to risks to historic buildings. There is much less on use and context in relation to risk in the conservation literature than in the general literature. Although the physical fabric remains the focus of conservation maintenance, the use of the building does affect the approach to risk. This is particularly the case where there is public access, where the risk is not only to the fabric (both through the wear and tear, and the facilities required by visitors), but also with regard to health and safety. John Allan discusses these issues in relation to his work for the National Trust at Willow Road (Allan, 1996). There is further discussion on this aspect in the Section 4.3.4.4 below.

In the conservation literature, links between risk and life cycle costing are not seen as being as relevant as they are in the general literature. Recently, however, Public Private Partnerships and private finance initiative projects have started to figure in the management of historic buildings, for example, in relation to a major Ministry of Defence building in London (Defence Estates, 2002).

4.3.4.4 Programmes and prioritisation

The conservation literature, like the general literature, uses a range of terms for maintenance, but there are similar underlying categories in both literatures. *The Defence Estates Repair and Preventative Maintenance Guide*, for instance, divides maintenance into preventative (avoidance of decay) and corrective (the renewal of decayed material). The conservation literature emphasises preventative maintenance, primarily in the interests of minimal intervention (rather than for budgetary control, as in the general literature). The need for some reactive maintenance is acknowledged, but the literature emphasises that all effort should be made to keep it to an absolute minimum, because it allows failure to occur (and hence the possible loss of historic fabric), BS 7913 (BSI, 1998 p8) states:

Systematic care based on good maintenance and housekeeping is both cost effective and fundamental to good conservation. Early action can often prevent decay and avoid the need for major intervention later.

Feilden and Jokilehto (1993, p41) suggest that preventative maintenance is ‘the highest form of conservation’, and comment on maintenance programming:

The maintenance programme is aimed at keeping the cultural resources in a manner that will prevent loss of any part of them. It concerns all practical and technical measures that should be taken to maintain the site in proper order. This is a continuous process not a product.

They go on to suggest (p42) that the following should be part of a preventative maintenance programme:

- appropriate administrative procedures and rehearsals of disaster drills;
- documentation;

- accountancy procedures, which identify recurring trouble spots in maintenance work;
- integration of maintenance tasks into a scheduled routine.

The *Defence Works Services Design and Maintenance Guide* (Defence Estates, 1999, p1) suggests that the main requirements for a successful preventative maintenance programme are:

- planned regularity;
- anticipation – based on quadrennial inspections and informed forecasting;
- responsible and reactive staff;
- quick response – to reported known defects especially on the external fabric.

These points are echoed by Feilden and Jokilehto, who propose that the maintenance programme should ‘follow well established cycles’ describing who does what, how this work is done and how frequently’ Feilden and Jokilehto (1993, p42). They expand this by saying that the evaluation of the programme should be based on resource expenditure and results.

Brereton (1991), Feilden (1982), and IHBC/SPAB/English Heritage (2002) identify the components of preventative (planned) maintenance as inspections (at different frequencies) and cyclical preventative tasks, for example, cleaning, clearing (gutters and drains), lubricating moving parts, removing plant growth and bird droppings, painting and testing (sometimes statutory or insurance based). Similarly, the importance of scheduled, but flexible, routines of daily, monthly, annual, and quinquennial maintenance tasks is emphasised by Feilden and Jokilehto (1993) and Feilden (1982).

Dann, Worthing, and Bond (2002) explore the relationship of planned and response (reactive) maintenance to conservation philosophy. They argue that planned maintenance, may encourage replacement or repair in advance of failure due to economic packaging of work or other management priorities. Clearly such a situation may conflict with the conservation principle of minimal intervention. The general maintenance literature also contains criticism of this practice (Williams, 1994, and Wood, 2003), but (as with the debate about preventative maintenance as a whole) the argument there is in relation to unnecessary expenditure, rather than the loss of ‘original’ fabric or cultural significance.

Hence, just-in-time (JIT) maintenance (referred to in Section 4.3.3.5; DETR, 2000; Smyth and Wood, 1995; Wood, 2003), may be more appropriate for the maintenance management of historic buildings as it is explicitly about minimising intervention.

The balance between preventative maintenance and repair is important not just in relation to the conservation of fabric. A consideration of cultural significance is important. As Clark (2001, p56) remarks

The sensitive repair and management of an historic building and its landscape is not just a matter of specifying traditional materials and techniques. It requires an appreciation of why the site is significant, how this significance is embodied in the fabric and what impact potential repairs might have on it.

Although, normally, the highest priority for historic buildings is to undertake preventative maintenance, the practicality of carrying out the works will affect the process of prioritisation. For example, tensions exist between the principle of minimal intervention and the costs of

access. This may lead to work being undertaken which will involve damage to original fabric, in order that further work does not have to be carried out for a long time. Feilden (1982, p224) illustrates this in relation to the repair of churches;

...towers, which need much more scaffolding, may be taken to justify repair work of a 60-year standard and spires a 90-year standard of durability. It must be remembered these parts are unlikely to receive routine minor repairs: furthermore, because the cost of reaching inaccessible parts of a building is so great, a higher standard of repair is justified.

As mentioned above, heritage organisations still have to consider the needs of users, particularly where the building is open to the public, and this can create further tensions vis-à-vis maintenance priorities (DCMS/English Heritage, 2002). The DCMS/English Heritage report lists conservation principles which should apply when greater public access is being considered. One of these principles is ‘an approved maintenance regime and the establishment of a fabric committee’. This, again, recognises the importance of management processes and a framework for maintenance prioritisation, if conservation and user requirements are to be reconciled. In addition to such user considerations, non-heritage organisations, because of the varying length of interest referred to above, will further modify maintenance priorities to minimise expenditure on properties with a short functional life. These issues are discussed in some detail in Vijverberg (2000).

4.3.4.5 Condition surveys, inspections, and stock data

The benchmark in the heritage sector is the quinquennial survey. BS7913 (BSI 1998 p24), for instance, recommends a five yearly ‘professional inspection’, where the inspector is familiar with the conservation manual and the log book. The purpose of the inspection is to gather the following information:

- general condition of all parts of the building;
- the progress of repairs since last inspection;
- the need for further repairs;
- the urgency and importance of such works, under the following four degrees of priority:
 - immediate (to be put in hand without delay);
 - urgent (within weeks or months, maximum 18 months);
 - necessary (before the next 5 year cycle);
 - desirable (but not necessary until beyond 5 years).

The quinquennial model is nearly 50 years old, originating in the Inspection of Churches Measures 1955, which is the only statutory recognition of the need to inspect historic buildings. Although the quinquennial model is very common in the conservation literature, many other types, and frequency, of inspection are referred to, both in the conservation and the general building maintenance literature. Chambers (1976), for instance, specifies a range of inspection frequencies as an essential component of maintenance for historic buildings.

The term ‘condition survey’ implies a record of the building’s condition at a particular moment in time. A second stage is the consideration of whether the condition is suitable for

the appropriate goals (keeping an historic building going 'for ever', or adequate for a particular use for non-historic buildings).

Dann, Worthing and Bond (2002) suggest that whilst the primary purpose of condition surveys for historic buildings should be to mitigate vulnerability and avoid any unnecessary loss of fabric, survey data has the potential to provide strategic monitoring information on the effects of policy decisions on the historic environment. They go on to suggest that if used in this way, condition surveys could satisfy the call for regular monitoring of the state of the historic environment, recommended in the *Power of Place* (English Heritage, 2001).

Some of the conservation literature refers to the importance of complementing formal inspections with the informal observations of building staff and users, in order that information on condition is as up-to-date as possible. Feilden (1982), and Feilden and Jokilehto (1993) emphasise the importance of making use of staff (for example, cleaners) and building users' informal observations of building condition, although they recognise the need for a co-ordinated strategy to collect, process, and store these observations so that they may inform action. Feilden (1982) also suggests that staff retention is an important factor in staff developing a thorough knowledge of 'their' buildings. Visits to carry out cyclical routines may also provide an opportunity for inspection and may be used to assess any minor damage which may then be rectified by patch repairs or minor replacement (Brereton, 1991). Such approaches to gathering data are also part of guidance for the non-heritage sector (see Section 4.3.3.5 above).

As previously mentioned, the general literature refers to the value of surveying stratified samples of a stock of buildings (see section 4.3.3.5). There is no similar discussion in the conservation literature the assumption being that surveying each building is necessary.

4.3.4.6 Information management

The architectural and archaeological traditions in relation to historic buildings result in a strong emphasis on record keeping. Such records may be in the form of accurate drawings, written description and/or analysis of the fabric GHBAU (1998), English Heritage (2001). The Defence Estates (2002, p48) suggests that,

The value of creating, retrieving and utilising good records cannot be overstated. They may prevent abortive work, reduce uncertainty about concealed fabric or obviate the need for resurvey.

There is less emphasis on such detailed records of the fabric and condition in general maintenance practice. Both the general and the conservation literature, however, recommend the keeping of on-going records i.e. a repository recording the nature of the building, key contacts, the recommended maintenance routines and a record of the maintenance carried out (maintenance manuals in the general literature, log books in conservation texts). The emphasis on recording the nature and reasons for maintenance action is stronger in the conservation literature (for example GHBAU, 1998; BS 7913:1998).

In terms of key documents, conservation and management plans have been discussed above. The 'all-in-one' conservation manual recommended by GHBAU has also been mentioned, this comprises:

- an architectural historical account;
- a description of the building's construction materials ;
- an account of the significance of elements;

- instructions on regular maintenance;
- an identification of vulnerable points and areas of risk;
- a list of duties and responsibilities of managers and agents;
- drawn information and surveys;
- provisions for review and revision;
- a requirement to lodge a copy with GHBAU.

Both GHBAU and BS 7913 recommend the use of logbooks, the British Standard characterises these as current information on key persons and managers and concise instructions on maintenance and inspection routines, and recommends that completed logbooks should not be destroyed, but should be kept as part of the permanent record of the building

Integrated databases are not discussed to the same extent in the conservation literature as in general texts, but there is a recognition of the need for a management system and culture capable of using the data to inform maintenance programming. Where such a robust management framework does not exist, it may be difficult, if not impossible, to carry out recommended routines. MacDonald (1996) discusses an example of this with regards to recommended cleaning cycles at the National Theatre. She concludes that the lack of clear communication between the designer/architect and the subsequent building managers can undermine plans made at the design stage.

4.3.4.7 Staff expertise and training

Professional expertise

A number of the construction and property professional bodies have accreditation schemes for their professional members related to conservation. For organisations with mixed estates this may be a particular issue, as GHBAU (1998, Part C p1) comments in relation to the government estate,

The accommodation managers, facilities managers, and managing agents with responsibility for the routine care of buildings in the government estate do not normally have special expertise in the conservation of historic buildings. The conclusion drawn is that “Specialist Conservation Consultants” should be appointed.

The multi-disciplinary nature of conservation activities means that it is likely that there will be a range of professionals involved in maintenance. Hence strong guidance from the assessments of significance and the associated management plans, is vital. Feilden and Jokilhto (1993, p58) comment that:

As so many disciplines are involved, it is essential that there be clear concepts to guide practice.....without well-defined concepts, conservation will fail in its objectives.

Management expertise

There is relatively little in the conservation literature regarding the management expertise required for maintenance management. Clark (2001) does discuss the range of specialists that may be involved in maintenance work on historic buildings, the implication of which is an increased management workload in terms of co-ordination.

Support staff expertise

The suggestion is made by Feilden (1982 p222) that a range of staff should make informal observations which then feed into the maintenance process. He emphasises the importance of appropriate expertise and training if this is to be effective,

...regular inspection by staff at specific levels according to their competence should be laid down...Staff must be of a suitable grade.....(and) they should be given simple training in reporting defects.

There is more discussion in the general literature on the training and use of support staff in maintenance management. For example, in the public housing and higher education sectors the freeing up of professional staff from some maintenance monitoring activity (for example, responding to user requests through help-desks, managing contact with call-out contractors etc.) is promoted (HEFCE, 1998; Institute of Housing, 2002). There is a danger in non-heritage estates that the specific needs of historic buildings may be overlooked.

Craft expertise:

The conservation literature focuses on specialist crafts skills needed for the repair of historic buildings, there is less about the skills required to minimise the need for repair (Heritage Lottery Fund, 2002). The Defence Estates (2002, p18) recognise, however, that:

...the success of works to historic buildings is very dependent on the procurement of contractors, builders, tradesmen, craftsmen or conservators who have the appropriate skills, knowledge, attitudes and a degree of sensitivity.

Feilden (1982, p217) observed that

...maintenance and preservation work [for historic buildings] is very skilled and needs responsible, competent and responsible craftsmen (who should be rated as technicians). The valuable men are dying off.

More recently there has been growing concern at the current and potential skills shortage in the conservation craft sector (HLF, 2002).

4.3.4.8 Financial management and performance measurement

As discussed previously, the general literature relating to the public sector has emphasised the benefits of greater financial control through adopting planned maintenance programmes (Audit Commission, 1986; Audit Commission, 1996; DETR 1999). This philosophy has become part of current public sector policies (for example, Best Value, Resource Accounting, business planning etc.). All of these policies require a longer-term view, including for maintenance. This is seen as a means of holding to account those who spend limited public money.

The potential negative impact of the annual budgetary cycle is highlighted by Langston and Lauge-Kristensen (2002) in terms of the problems of budget over-runs and under-runs. In order to balance the books reconciliation takes place between budgets. Extending the proposed cycles of cyclical maintenance is one easy way to reduce costs when budgets are likely to be overspent, while in the case of surplus money at the end of the financial year there is a tendency for ad hoc repair and maintenance work being undertaken to use up funds. Clearly this may undermine the principle of minimal intervention. Hence both situations could have an adverse effect on the conservation of historic buildings.

The different ways in which maintenance services can be procured are discussed by the RICS (2000). There is very little discussion of appropriate budgeting, or procurement, processes for conservation maintenance.

Similarly, the conservation literature tends not to mention the measurement of 'quality' or performance indicators. GHBAU, however, does monitor the implementation of a discursive 'Nine point Plan of Action' by various government departments and agencies, but there are no deadlines or clear assessment criteria to allow a robust analysis of relative performance (and adoption of the guidelines is voluntary).

4.3.5 Conclusions: gaps and key themes in the literature

4.3.5.1 Gaps in the conservation literature

Some of the areas where there are gaps in the conservation literature compared to the general literature have been identified, or implied, in previous sections of this review. These are included in the summary below.

There is little in the conservation literature on the following:

- the management of the co-ordination between maintenance and other activities affecting significance (changes of use, visitor/user management, interpretation, context, etc.), and between the maintenance organisation and the statutory bodies, amenity and advisory groups with an interest in historic building/s;
- maintenance management for portfolios of properties, as opposed to individual properties. In particular, the issues facing mixed estates as a result of the differences between the motivation and drivers for maintenance relating to historic buildings compared to those for non-historic buildings;
- the importance of the relationship between organisational goals, building use and maintenance. (This gap is because the focus is on historic buildings owned by heritage bodies, where the buildings are the 'core business', rather than by other types of organisation, where the 'core business' is the product or the service, and the views of users, customers, and other stakeholders carry more weight.);
- maintenance management processes, as opposed to separate maintenance activities. There is a lack of an holistic approach and insufficient recognition that maintenance management might be organised differently in different situations;
- the importance of a clear framework for decision-making, which records the reasons for particular decisions, and the individuals/organisations involved in taking them. Such transparency could inform future decision-making, and allow previous decisions to be re-visited if circumstances had changed;
- the organisational and financial implications of minimal intervention (for example, very frequent inspections, qualified and multi-skilled staff available to carry out frequent maintenance work).
- integrated databases;
- the advantages and disadvantages of using in-house staff for the management and execution of maintenance, compared to outsourcing the work. Also, the management

implications resulting from the large number of small specialist contractors and independent craftsmen often used for historic building work;

- the particular tensions between legal requirements (for example, for health and safety), the need to support a viable use (which may generate a need for alteration or refurbishment), and the conservation principle of minimal intervention;
- budgeting and procurement processes for conservation maintenance;
- performance indicators, and other measurements/judgements relating to 'quality'. There is also a lack of recognition of the different interpretation of 'quality' by different groups and individuals.

4.3.5.2 Key themes from the literature; best practice advice for historic buildings

The following key themes relating to best practice maintenance of historic buildings have been identified from the conservation literature, augmented by points from the general literature, where appropriate.

Strategy/Policy

Maintenance should be considered at a strategic level within an organisation so that it can be linked to the 'core business', corporate goals, and the wider political, economic, social and statutory environments.

A fundamental component of a maintenance management service for historic buildings is an understanding of cultural significance, and the most appropriate means of achieving this is through the conservation plan methodology:

- the complexity of the assessment of significance should reflect the importance and complexity of the building;
- in most 'mixed' estates (with, for example, grade II listed buildings) a conservation statement will probably suffice;
- the assessment should be dynamic, developing over time.

Management plans for historic buildings should be informed by the assessment of cultural significance/conservation plan.

Maintenance strategy/policy needs to:

- be related to the management plan for the historic building;
- emphasise preventative maintenance;
- emphasise minimal intervention;
- be set in the context of undertaking a risk management exercise;
- reconcile the needs of the users, and the needs of the organisation, with the conservation needs of the building;

- establish a framework of procedures for procurement, monitoring, feedback and formal quality management, which encompasses identifying appropriate service standards and performance measures;
- establish required levels of staff expertise and training.

Programming and prioritisation

- A programme of planned cyclical preventative maintenance should be devised and implemented.
- Priorities should take the assessment of cultural significance of the elements/components and their vulnerability as a starting point, but need to relate also to functional issues, and the practicalities of carrying out the work.

Condition surveys and inspections

- The purpose and planned uses of condition surveys should be clear at the briefing stage, these should be agreed and recorded, and then kept under review.
- Condition surveys should be undertaken by suitably qualified personnel, they should, normally, provide an assessment of condition, make recommendations about the optimum moment for, and nature of, intervention, and inform decisions about priorities. They should also appraise the quality of previous.
- A quinquennial or a quadrennial regime of condition surveys is recommended.
- Annual inspections, under the supervision of a suitably qualified person, should be used to review and update condition surveys and inform annual programmes of work. More frequent inspections are recommended for vulnerable elements and components, and/or those of particular cultural significance.
- Informal observations of condition by users, and staff visiting premises for any purpose, should be encouraged and recorded in such a way that they can inform decision making.

Records, information management and databases

- Drawn and descriptive records of the fabric, conservation plans/statements of significance and management plans (if appropriate) should be stored in an easily retrievable format. If possible they should be linked by an integrated information system which also records condition, the reasons for, and nature of, any work carried out, and contact details for relevant staff, consultants and contractors.
- A conservation manual or log book should be provided and used for each historic property.

Staff expertise and training

- There should be an understanding of the limits of specialist knowledge within the organisation and appropriate outsourcing policies to ensure that the organisation has the required skills available.
- Management expertise is important as well as technical expertise.
- Support staff should be suitably trained, particularly in user- and contractor-focused activities.

Budgets and accountability

- Some flexibility should be allowed with regard to budget cycles in order to avoid unnecessary or damaging work.

This concludes the review of key maintenance issues highlighted by the conservation and general maintenance literatures. The following section presents three illustrations of maintenance management from the non-heritage sector.

4.4 Three illustrations of maintenance management from the non-heritage sector

4.4.1 Introduction

The objective of this examination of three non-heritage organisations was to illustrate current maintenance management practice in three different sectors. This will be used together with the literature review to inform the design of the empirical research into organisational approaches to the maintenance of listed buildings. The organisations researched for this section of the report were:

- a housing association;
- an NHS hospital trust;
- a private sector commercial organisation.

4.4.2 Methodology

An interview was undertaken with a senior maintenance manager in each of the organisations, following an examination of general best practice guidance and related sectoral best practice guidance.

The organisations interviewed were identified through existing contacts in the relevant sectoral bodies responsible for regulation and quality issues. In practice this meant NHS Estates and the Housing Corporation. The private sector commercial organisation was a financial institution whose property management approach is not subject to sectoral regulation.

Elements of best practice maintenance management (as identified in the literature review) are reviewed for each case study. A summary comparison is contained in Section 4.4.3.8. The full case study reports are in Appendix 1.

4.4.3 Summary comparison of best practice maintenance management

4.4.3.1 Introduction

This section analyses the elements of best practice maintenance management demonstrated by the case study organisations against the generic best practice criteria identified by the literature review.

4.4.3.2 Clear aims and objectives

Housing association

Clear aims and objectives are partly imposed by the Housing Corporation and partly by the Housing Association Board. Aims and objectives of Technical Services Department clearly defined and under constant review.

The Housing Corporation requires housing associations to:

- set a strategic long-term approach to maintain, decent, sustainable homes;
- engage effectively with residents and their homes;
- manage effectively planned and capital programmes;
- run an efficient responsive repairs service;
- improve performance management and competition.

The Housing Corporation's recent guidance on Regulation, *The Way Forward – Our Approach to Regulation* (Housing Corporation, 2002) sets out a number of criteria for effective maintenance management. It requires associations to provide well maintained homes, to carry out maintenance effectively and in a way that reflects tenant preferences, and to ensure adequate investment to protect the long term needs of the stock.

NHS hospital trust

NHS Estates provides extensive guidance to trusts regarding the strategic maintenance management of the estate. The aims and objectives of the maintenance function are clearly defined.

The overarching aspirations of the maintenance organisation have to be viewed within the context of facilities management and the overall strategy of the estate. Physical condition is just one of several factors to be considered when assessing need. The six facets of land and property appraisal are:

- physical condition;
- functional suitability;
- space utilisation;
- quality;
- fire and health and safety requirements;
- environmental management.

This suggests that there may be a tension between the maintenance needs of the building and the priority given to these needs when viewed against other organisational goals.

In the case of the trusts served by the estates office studied there is a definite strategy of rationalising from old, obsolete buildings into new functional and efficient buildings. The long-term maintenance needs have to be assessed against the predicted programme of

replacement. This is a particular issue for listed buildings where the key issue is to keep them occupied and serving a purpose.

The short and medium needs are measured increasingly against risk (statutory, operational of business) and, more recently, the impact on patient care/recovery. It must be noted however that the increasing demands of statutory compliance (for example, fire precautions and health and safety) and consideration of patient care are not reflected in the provision of 'new money'.

Objectives for maintenance management are therefore set within this overall strategy¹.

The overall object in undertaking maintenance within healthcare organisations is therefore to ensure that assets are available in good, safe, reliable and effective working order for day-to-day use. The degree and types of maintenance will depend upon the function and cost of individual assets. In some cases it may not be cost effective to do any maintenance because the combination of service dependency and cost of the asset is relatively low and total replacement is the cheaper option (Estate Code 6.16).

Financial services organisation

Maintenance policies are set within the overall context of facilities management and prioritised according to the consequential risk of non-performance. For example, a failure causing the loss of a data centre would be of more significance than a high street outlet. The former would also be resource intensive in terms of plant and equipment.

There is a clear understanding that the role of facilities management is to meet the business objectives of the organisation and the importance of the maintenance function in supporting this.

Maintenance policy is currently implicit rather than expressed explicitly through documentation. This is currently being reviewed in line with good practice.

4.4.3.3 Clear policies and procedures

Housing association

The Association has well defined and closely monitored policies and procedures for all aspects of service delivery including:

- repair responsibilities (generally);
- alterations and improvements by the tenant;
- repairs priorities;
- emergencies (out of hours);
- customer care & tenants right to repair scheme;
- pre and post-inspections;
- list of approved contractors and annual review;
- recovery of non-rental debts and pre-paid repairs;

¹ All NHS Estate's publications referred to in this report can be found at:
http://www.nhsestates.gov.uk/property_management/index.asp

- insurance claims;
- relets, removal allowances & redecorating allowances for new tenants;
- cyclical work;
- decanting procedure for major works;
- handover procedure & end of defects inspection procedure;
- office procedure - orders and payments.

Summaries of the above are included in a variety of booklets available to tenants. Policies and procedures are reviewed and revised on a regular basis.

NHS hospital trust

Policies and procedures are well defined through a comprehensive set of guidance published by NHS Estates. Key documents are:

- Estatecode - a user manual for managing a health estate: includes a recommended methodology for property appraisals and provides a basis for the integration of the estate into corporate business planning;
- Health Building Notes: advice for project teams procuring new buildings and adapting or extending existing buildings;
- Health Technical Memoranda: guidance on the design, installation and running of specialised building service systems, and on specialised building components;
- Health Facilities Notes: debate current and topical issues of concern across all areas of healthcare provision;
- Encode: shows how to plan and implement a policy of energy efficiency in a building;
- Firecode: for policy and technical guidance on fire precautions;
- Assets in Action: an asset management guide for non-technical managers;
- Developing an Estate Strategy: assistance in developing a robust strategy;
- Facilities Management Good Practice Guides: guide No 2; Maintenance Services: the use of performance indicators in working towards a culture of 'best' practice.

The Estatecode document includes specific guidance on asset maintenance including: maintenance systems; staffing; technical management; risk management; health & safety management; output specifications; selection of contract.

Financial services organisation

Policies and procedures are in place but the fragmented nature of the organisation causes inconsistencies. New policies and procedures are being developed around a central strategy unit and a new asset register. Indications are that this will follow the essential elements of good practice as defined by the Royal Institution of Chartered Surveyors (RICS) and the Chartered Institution of Building Services Engineers (CIBSE).

4.4.3.4 Coherent information processes

Housing association

The association has a computer based system for routine maintenance which includes the facility to produce a variety of reports showing, for example:

- repairs history dwelling by dwelling;
- costs against budget;
- jobs outstanding;
- jobs overdue;
- jobs contractor by contractor.

The association also has a database, based on a recent stock condition survey, showing long term cost projections on an element by element basis. These cost projections are used by the finance section to inform general business planning and by the maintenance section to plan major repairs programmes.

Regular reports on all aspects of routine and planned maintenance are provided for the relevant management committees.

NHS hospital trust

NHS Estates do not recommend any system in particular but suggest trusts exercise extreme caution before committing funds to new hardware and software. The NHS 'PRINCE' system can be used to assist in the procurement of such systems. Specific 'one off' systems are to be avoided.

The estates service studied uses the established integrated Works Information Management System (WIMS) to handle data. Data collection is often carried out on a paper based system rather than by electronic means. Reports can be constructed through the use of Access database and Crystal report generator. The Health Care Facilities Consortium is currently working on a new generation of the WIMS system that will pick up some of the deficiencies and interface directly with Windows.

A number of more sophisticated systems do exist including those that will link with CAD systems to which data can be attributed.

Financial services organisation

Much of the maintenance data currently captured is held by the consultants, suppliers and contractors employed on the maintenance function. The problems associated with lack of ownership of and access to information is recognised.

The procurement of a new, fully integrated property database is seen as an essential tool in setting up the new asset planning team. This will provide an asset register, hold historic data and assist in the logging of condition data and management of the maintenance operation.

The lack of convincing historic information is cited as a difficulty in making the business case for a maintenance strategy. The new system will account for this and incorporate an appropriate coding system for data retrieval.

A help desk has been established to take all requests for response maintenance. Staff is trained to interpret some of the technical issues that arise so that an appropriate works request is sent out. Where there is any doubt, or where repeated requests come through then a surveyor or engineer will investigate.

Whilst work requests are coded the data cannot be easily interrogated. The new asset database will include data on work type and response times.

4.4.3.5 Comprehensive stock data

Housing association

The Association's strategic planning is based on information provided by its stock condition survey. This includes an assessment of future repairs needs over a thirty year period. The survey collected data on:

- an assessment of the cost and life cycles of individual elements; roofing, windows etc;
- potential improvements;
- existing attributes; central heating, security, etc;
- energy audit;
- hazardous materials.

The data from stock surveys is not just used by the maintenance department. It is also of use for:

- financial planning;
- grant applications;
- loan applications;
- insurance and valuation purposes;
- showing compliance with regulations.

The Housing Corporation expects associations to have detailed knowledge of their stock and there is extensive guidance provided by the Corporation, and by the Office of the Deputy Prime Minister, on commissioning and undertaking stock surveys.

NHS hospital trust

It is a mandatory requirement that NHS trusts submit an Estates Return. This provides an indication of the status of Estates & Facilities services in the NHS for the Department of Health. The development of the Performance Management Framework agenda has led to the data now being used to inform a set of performance indicators to measure the performance of a Trusts Estates and Facilities Services. Over time these will permit Trusts to demonstrate year-on-year improvement in line with the NHS Plan.

Trusts are also encouraged to use performance indicators as a measure against good practice and benchmarking against the performance of trusts with a similar estate profile. In the case of the estates office studied this is still an aspiration for the trusts that it serves rather than reality.

The policy within the estates office studied is to inspect plant and buildings once a year. Estate management teams are organised within geographic areas and a pairing of an engineer and a building officer carries out the inspections. Their responsibility is to know the property on their patch, appraise it annually and update the records. These returns are used to feed into the preparation of the maintenance programme, development of the estates strategy and ERIC (Estates Return Information Collection).

ERIC returns are collected under a set of headings in respect of estate services. Core data is captured annually on the ERIC database for the purposes of generating a set of performance indicators.

Financial services organisation

Currently data is held in a number of different places and formats. Contractors and suppliers hold a high percentage of the data. With the new system (described in Section 4.4.3.4) codification and the use of standard phraseology will provide essential data on condition surveys.

No particular period is set for the frequency of surveys although this will be considered within the new strategy. Detailed external condition surveys are likely to be undertaken on a maximum 5 year cycle to bring forward major items such the replacement of roof covering or façade renewal.

Otherwise the rate and detail of inspection is likely to be based upon risk and complexity. Complex items of plant may be under a continuous remote monitoring where maintenance is condition dependent

4.4.3.6 Suitable management programme and prioritisation

Housing association

Planned maintenance programmes are developed from the stock condition survey. In addition to planned maintenance, the association has a number of other maintenance programmes. These include:

- routine maintenance – mostly minor jobs, either reported by tenants or association staff, and carried out on a response basis;
- cyclical maintenance – regular items such as gas servicing, alarm servicing and painting;
- void works – works required before re-letting a property.

The association is aware of the need to keep routine (response) maintenance to a minimum. Planned programmes, informed by regular stock condition surveys, offer a number of advantages over response maintenance. These advantages are both strategic and operational. At the strategic level a planned programme of repairs:

- helps produce future funding needs;
- provides data to supports bids for funding;
- allows for rolling programmes of work;
- allows 'what if' enquiries;
- provides data to make rational decisions regarding priorities;

- improves quality of stock.

At the operational level the planned programme:

- ensures lower contractor costs through economies of scale;
- reduces overheads through batching of work;
- provides a learning curve for contractors;
- ensures regular surveys of monuments;
- reduces risk and inconvenience to the public;
- allows better control of budgets.

Where resources do not meet projected needs some form of prioritisation is required. Properties are prioritised using a number of criteria including building condition, local housing need, health and safety, legal action, the business plan, general asset management objectives.

NHS hospital trust

The estates office studied uses a simple coding system for planned maintenance proposals costed within a 5-year plan:

- P1 is for funding this year;
- P2 is that for which funding is desirable this year but that can be deferred for one year;
- P3 is within 5 years.

Codes are used for asset identification and category of work as well as priority and held on the WIMS system.

It is common practice to grade maintenance requests into groups that reflect service needs, patient care/quality and the risk to the organisation. Minimum response times are agreed as part of the service level agreement.

Accessibility of the estates service to the trust(s) is a key factor in providing a response maintenance service. The creation of help desks and customer hotlines are cited as being good practice solutions to aid communication between the customer and the estates office.

Since the introduction of controls assurance there has been a move towards 'risk-assessed maintenance systems. Maintenance regimes go beyond that of response versus planned. The following systems are currently used.

Planned Preventative Maintenance (PPM)

Regular inspections are carried out to establish the condition and future requirements. These inspections become more thorough as time elapses. Feedback from inspections is key to considering and correcting the frequency and content. A PPM system of inspection only (that is, no actual repair/servicing work) with work correction to follow has generally proved to be expensive and ineffective.

Condition-based maintenance

Since the initial introduction of PPM within the NHS, technology and improved design has led to a marked increase in the reliability of building infrastructure, plant and equipment. In parallel with these advances industry developed a system of maintenance based on the condition of plant and equipment as opposed to the fixed, pre-determined routines of PPM.

The claimed effects of adopting condition-based maintenance are:

- a reduction in maintenance frequencies;
- a reduction in production downtime;
- a reduction in overall costs;
- avoidance of 'damage' by opening up for checking.

PPM schedules were determined by reference to manufacturers' information. Under condition-based maintenance the reliability of each item of plant or equipment is assessed individually. This is achieved by examining operating characteristics such as:

- hours run;
- environmental impact;
- performance output.

Measurements of this type require the use of data gained from Building Management Systems (BMS) and Energy and Building management Systems (EBMS).

Risk-based maintenance

Plant and equipment failure affects health and safety, and subsequently overall business risk throughput and costs. This has led to the development and adoption of RMB systems.

All NHS organisations should have formed controls assurance teams to implement the principles of corporate governance. These teams will use a control framework to manage the research, development, introduction and monitoring of maintenance procedures. The control framework consists of five interlocking elements:

1. risk management standards;
2. management models;
3. risk management processes;
4. self assessment;
5. benchmarking.

The risk-based maintenance systems form a fundamental link with all parts of the control framework. Traditional maintenance systems that follow the PPM and condition based systems do not necessarily meet these criteria.

The chosen maintenance strategy will take into account cost, safety, and environment and operational consequences.

Reliability-based maintenance

Reliability-based maintenance operates on three levels:

1. it forces a structured evaluation of failure consequences in a way that integrates decisions about safety, operating economics and maintenance costs;
2. it incorporates new findings on the failure patterns of complex equipment into a new approach to the selection of PPM tasks, and actions that should be taken if suitable preventative tasks cannot be found;
3. it combines both activities into a single decision making process.

How the failure occurs, or what its technical characteristic are, is not the issue. The failure is evaluated in terms of the following:

- hidden failure consequences, which have no direct impact but increase the risk of later;
- more serious failures:
 - safety consequences, involving danger to life;
 - non-operational consequences whose only impact is the cost of repair;
 - overall this system of maintenance is based upon the following principles;
 - preventative maintenance is compulsory when there are safety consequences;
 - the direct effect on patient care must be fully taken into account and may be the determining factor in some cases of operational / non-operational failure.

Financial services organisation

A clear distinction is made between planned and reactive maintenance and a target of 75/ 25 per cent is set as a goal. The current split is thought to be nearer 60/ 40 per cent.

Likewise clarity exists regarding the separation of 'condition dependant' versus 'condition independent' maintenance. The latter requires the use of interim assessments to check whether planned targets for building fabric are realistic.

Complex buildings with high levels of plant and equipment incorporate remote sensors where possible to monitor condition and judge maintenance needs.

Risk assessment plays an increasing role in setting the maintenance budget. Risks may be those arising out of non-compliance with statutory obligations, such as the maintenance of fire equipment, or that affecting critical aspects of the business through breakdown or closure.

Data processing centres are an example of a facility that has an absolute 24/7 requirement. This is the only case where the organisation interviewed has directly employed labour.

Working within a system of facilities management will inevitably have an impact on the priority given to maintenance. FM tends to sharpen the strategy towards meeting business objectives through the inclusion of associated property issues, such as space utilisation and property value. If latent value can potentially be release through sale and relocation into a bespoke building then condition may become less. This may skew decisions away from condition-based assessments in setting appropriate standards of repair.

4.4.3.6 Competent staff

Housing association

There are currently eight surveyors and eight administrative staff (excluding the in-house repairs team). The Technical Services Director is a Chartered Surveyor. Two other staff are working towards professional qualifications through local block release courses. The admin staff have limited technical expertise and the need for more training has been identified in a recent Best value Audit.

NHS hospital trust

The directly employed labour (DEL) maintenance team, which may be made up of technical, managerial and artisan staff fulfil four functions:

- acts as the informed client (development and management of the maintenance plan);
- manage the maintenance department;
- undertake DEL maintenance tasks;
- keep the asset base of the organisation in an agreed condition.

The size of the DEL team will depend upon the size of the programme and the range of skills required. Specialist surveys or contracts will normally be undertaken by consultants/contractors.

In the case of the estates office studied only 30 per cent of the total maintenance budget is currently carried out by DEL. However, that same DEL was able to operate across a number of NHS organisations within a sensible geographic area offering cost advantage in areas such as decorating.

On the managerial and technical side of operations the estate office employs a staff of 8 split between facility managers, building offers and engineers. Additional; consultants are employed where the volume or nature of work make specific demands that can't be met. Particular examples would be that of access audits for demonstrating compliance with the Disability Discrimination Act or the compilation of Asbestos Registers.

Financial services organisation

The company is undergoing a number of changes in the way that the task of property maintenance is managed. Within this change new staff have been appointed and new practices brought in.

The initial shift was to develop a move towards facilities management. This has developed a more strategic approach and has brought some property issues such as major procurement and confirmation of maintenance budgets into the boardroom.

The creation of central strategy and performance team has assisted in the development of centralised systems and a move towards creating an integrated property database.

Difficulties in achieving consistency in the Implementation of policy through condition assessments and making planned maintenance bids is recognised. Systems of training and monitoring are being developed.

The organisation will employ consultants for specialist tasks (for example, work to historic buildings) or where workload necessitates. No architects are employed in-house and so all

design work is outsourced. With the exception of data centres maintenance work is carried out by external contractors. Data centres therefore gain the advantage of acquired knowledge, loyalty and responsiveness associated with directly employed labour in keeping critical sites operational. Conversely there can be a loss in terms of competitiveness especially if staff are not kept gainfully employed.

The establishment of a central help desk facility has proven particularly successful in fielding technical enquiries.

4.4.3.7 Cost effective financial and procurement systems

Housing association

Day to day maintenance is currently carried out by an in-house repairs team and a local firm of contractors. Historically, all routine maintenance work has been carried out in-house but the new Technical Services Manager is exploring other options. The local firm of contractors was appointed after an extensive tender process. The contract is for three years and is based on a standard schedule of rates. The contract is subject to annual review. Variations of up to £50 are permitted, anything over this needs the Association's approval. Approximately 20 per cent of jobs are pre-inspected and 10 per cent post-inspected. Tenants are sent pre-paid reply cards and about 10 per cent of these are returned to the office. Any negative comments are followed up.

Major works are mostly carried out through traditional fixed price contracts although a number of partnering initiatives are being considered.

NHS hospital trust

Specific guidance is given by NHS Estates regarding the procurement of new works or maintenance contracts.

Service level agreements (SLAs) are a key component in ensuring that client expectations and services to be provided are quantified and understood.

SLAs are used not only to specify issues such as the quality of workmanship and materials but also issues such as response times. SLA should be defined and measurable against actual performance.

Typically SLA specifications would include:

- service scope;
- objectives;
- standards: technical, patient's charter, response times;
- service requirements: statutory and client specific obligations;
- performance measures: indicators;
- monitoring arrangements: indicators, measurements, feedback mechanisms;
- standard payment mechanisms.

Financial services organisation

Information on the basis of maintenance procurement (for example, schedules of rates) was not captured in detail but systems are being reviewed.

4.4.3.8 Methods of measuring performance

Housing association

Performance against a number of criteria is measured and monitored regularly. This occurs through internal monitoring and external inspection. The results of the latter are available for public viewing on The Housing Corporation web site.

The association has developed its own criteria for assessing the effectiveness and efficiency of its service. Performance is measured for the following reasons:

- to indicate whether objectives are being achieved;
- to provide information as a basis for formulating policy;
- to assist with budgeting, and assessing value for money;
- to ensure that appropriate attention is paid to the needs and views of the clients;
- to ensure that agreed standards of service are set and attained;
- to demonstrate accountability.

Typical performance criteria might include:

- jobs completed per period;
- average cost per job per area;
- jobs outstanding (various time scales);
- speed of repair per target response time;
- proportion of repairs by category - emergency, routine etc;
- number of recalls;
- number of complaints;
- Percentage of post inspections;
- quality of work;
- total cost as percentage of whole budget;
- contractor review;
- commissioning costs as percentage of expenditure.

At regular intervals housing associations are subject to detailed inspections by The Housing Corporation. These formal, and detailed, inspections examine the quality of service and the association's commitment to continuous improvement, looking at all the main factors that affect customer experience and satisfaction.

The inspections result in a detailed report which sets out:

- the context in which the housing association works, detailing background information and what the inspection covered;
- the main characteristics of each service area covered;
- recommendations for improving performance;
- recognition of any activities that the association is already involved in that will help to improve its performance;
- observations on aspects of service delivery which the association might wish to review;
- an overall assessment of how good the service is and whether the association is working for continuous improvement.

NHS hospital trust

NHS Estates' Performance Management Division is dedicated to supporting healthcare managers to be able to base their decision on up-to-date and relevant information. Key activities include:

- quarterly Monitoring Report;
- reporting on fire compliance and production of the annual fire incident report;
- responsibility for health and safety issues relevant to the estate;
- collecting and analysing data compiled in Trust Financial Proformas as well as providing information to trusts in the form of Estates Returns Information Collection (ERIC) software which includes key performance indicators for trusts.

Financial services organisation

The lack of, or incompatibility between, data sets is recognised as a key issue in the procurement of a fully integrated asset register. Much of the data that can be made available is held on different systems and is in the hands of the contractor or supplier of services. The new system will bring these disparate data sets together.

The organisation is one of 22 participants in the FM Benchmarking Project being undertaken by the Occupiers Property Databank (OPD). The project is in its second year. It is organised around a quarterly process of defining best practice through data collection, reporting and discussion on an 'open book' basis. The OPD also offer significant advice on building performance measurement.

Similar services are employed through the use of the Investment Property Databank to establish benchmark performance against issues such as occupancy cost.

4.4.3.9 Summary

Table 4.1 analyses the elements the maintenance management demonstrated by the case study organisations against the generic best practice criteria identified in the literature review.

Table 4.1 Summary comparison of maintenance management in three non-heritage sector organisations

Criteria	Housing Association	NHS hospital trust	Financial service organisation
Clear Aims and Objectives	These are partly imposed by the Housing Corporation and partly by the Housing Association Board. Aims and objectives of Technical Services Department clearly defined and under constant review.	NHS Estates provide extensive guidance to trusts regarding the strategic management of the estate. The aims and objectives of the maintenance function are clearly defined. Maintenance policy is set within the overall context of risk management	Role of facilities management in meeting the business objectives of the organisation is clearly understood. The maintenance policy supports this and although not so clearly defined is under review in line with good practice.
Clear Policies and Procedures	Policies and procedures are well defined and monitored by the Housing Association. They are also made available to tenants in summary form	Policies and procedures are well defined within guidelines published by NHS Estates.	Policies and procedures are in place but the fragmented nature of the organisation causes inconsistencies. New policies and procedures are being developed around a central strategy unit and a new asset register. Indications are that this will follow the essential elements of good practice as defined by the RICS & CIBSE.
Coherent Information Processes	Computer based recording and ordering of routine and planned maintenance allows each discrete stage to be monitored. Monthly reports can be produced showing a detailed analysis of expenditure, budgets, outstanding work etc.	Computer based recording and ordering of routine and planned maintenance allows each discrete stage to be monitored. Monthly reports can be produced showing a detailed analysis of expenditure, budgets, outstanding work etc.	Current recording systems are fragmented and suppliers and contractors hold much of the data. A new fully integrated and computerised database is being procured. This facility will hold condition assessment, assist in retaining historic data, manage planned / response maintenance and enable the prioritisation of future work.
Comprehensive Stock Data	Stock survey carried out in-house every 5 years on a sample basis (10 per cent). Information is collected on repairs and renewals to all elements (to provide a 30 year projection), potential improvements, and now includes the Decent Home Standard.	Stock survey carried out on an annual basis. This information is used to compile the planned maintenance programme and to provide data for the central data return (ERIC)	Historic data is neither complete nor held in a manner that enables effective analysis. Within the new system codification and the use of standard phraseology will provide essential data on condition surveys.
Suitable Maintenance Programmes and Prioritisation	Developed from the stock condition survey. Properties are prioritised using a number of criteria including, health and safety, legal action, the business plan, general asset management objectives.	Developed from the stock condition survey. Properties are prioritised using a number of criteria including, primarily these are risk based being health and safety, legal action, the business plan, general asset management objectives. Maintenance regimes go beyond that of response v planned.	Developed from stock condition surveys. A high proportion of planned, rather than response, maintenance is achieved (60 per cent) but targets are driving this further (70 per cent). Works are prioritised towards statutory and business risk rather than being simply condition focused.
Competent Staff	Senior staff professionally qualified (RICS, CIOB). Junior staff on day release courses. Training monitored by Housing Corporation. Some staff making technical decisions with limited technical expertise.	Senior staff professionally qualified facilities managers, surveyors and engineers. Junior staff provide technical support. Direct labour employed for routine maintenance and repair.	Senior staff professionally qualified and primarily facilities managers, building surveyors and quantity surveyors. Clear separation now achieved between the central strategic unit and service delivers in the regions.
Cost Effective Financial and Procurement Systems	Closely monitored by Board and Housing Corporation.	Clear guidance is provided by NHS Estates regarding procurement and financial control. A robust system of service level agreements provide a clarity of expectation on both sides	More robust systems bring developed.

4.5 Conclusions

4.5.1 Introduction

From the literature review and illustrations of maintenance management from non-heritage sector organisations it is possible to identify the key features of a best practice approach to the maintenance management of listed buildings. These are highlighted below.

4.5.2 Applying conservation principles to maintenance

In addition to retaining functionality an over-riding objective to the approach for listed building maintenance is to retain and enhance cultural significance. This should be achieved by avoiding unnecessary intervention through a process of preventative maintenance based on careful consideration of the nature and possible consequences of the defect. Where intervention has to occur this should be on the basis of doing the minimum necessary. The implication for organisations with responsibility for the care of listed buildings is that maintenance should have a greater centrality and importance and, that where there is a mixed stock of buildings, the maintenance management service should distinguish between them.

4.5.3 Taking a strategic approach to maintenance

Maintenance management decisions should be integrated with the corporate objectives. Given the importance of maintenance for listed buildings, an overarching strategic plan for heritage organisations should have a clear indication of how maintenance is to be managed and where this function resides in the organisational structure. Indeed, for heritage organisations it should be considered one of the key issues that should help drive any strategic plan. Best practice for the maintenance management of listed buildings requires the development of a plan for maintenance which integrates this activity with a wider strategy for the management of the built assets and one which recognises cultural significance and its vulnerability.

4.5.4 Clear and appropriate policies and procedures

Explicit policies should provide the framework for decision making and practice and include a clear statement of objectives and methods to be employed to meet those objectives. Conserving cultural significance and minimal intervention in the fabric of the building should be the primary principles which inform the maintenance policy and its implementation for listed buildings.

4.5.5 A planned approach governed by conservation principles

A planned, (that is, predictive rather than responsive) approach to the maintenance programming for listed buildings is essential. General best practice guidance suggests that the prioritisation of maintenance activity should take account of the condition of the fabric. It emphasises, however, the importance of prioritisation in the context of other factors, such as the effect of the condition on, for example, overall performance of the particular asset or the overall property strategy of the organisation. For listed buildings this context should be the relative cultural significance and vulnerability.

4.5.6 Frequent inspections tailored to significance and vulnerability

Regular inspections are a fundamental part of a preventative maintenance programme. Clarity about the purpose and uses of condition surveys is essential. A condition survey should provide an assessment of condition, identify the optimum moment for intervention, and aid the prioritisation of actions and planning for the future. It is also seen as a useful opportunity

for a strategic review of the management of maintenance. Best practice also suggests that there should be interim surveys between the more formal condition surveys. The literature says that condition surveys for listed buildings should be informed by an assessment of cultural significance and that the frequency of inspection should relate to this assessment of significance and vulnerability of the element/component. Best practice suggests that for listed buildings there should be an emphasis on greater incidence of inspections of the fabric with the aims of reducing physical intervention, 'As much as necessary and as little as possible'. This 'just-in-time' approach implies frequent inspections which are tailored to the significance and vulnerability of the element or material.

4.5.7 Effective use of informal observations of building condition

Dealing effectively with condition information from building users other than those directly related to the maintenance department is an important part of recommended good practice. The presence of non-technical staff and other users and visitors on a daily basis can provide the maintenance function with vital information regarding condition which would otherwise wait until subsequent inspection cycle, or until failure becomes impossible to ignore.

4.5.8 Coherent information processes

Good information and records are vital for the effective maintenance management of listed buildings. This is because, in addition to enabling good management practice, effective records detailing the historical development of the building, are an integral part of the cultural history of the building and they also help explain how and why the building is significant. A major responsibility for a maintenance manager is to manage the collection, storage, and retrieval of suitable information to ensure efficient and effective maintenance management. Because the nature and form of information produced and required by maintenance activity is extremely diverse, maintenance information should be stored on an integrated database. The information stored should also be easily retrievable and amenable to manipulation to inform both tactical and strategic processes.

4.5.9 Monitoring and review systems

Monitoring and review of the maintenance function with regard to the principal aim of protecting cultural significances is essential. Long term financial planning and ringfenced budgets for maintenance are also essential if coherent and comprehensive maintenance management systems are to be implemented successfully.