



# Towards innovative building maintenance

Innovative  
building  
maintenance

Brian Wood

*Department of Real Estate and Construction, Oxford Brookes University,  
Oxford, UK*

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## Abstract

**Purpose** – Building maintenance is not sexy – yet it is big business, arguably more than new-build. It is under-researched. Received wisdom from the 1960s and 1970s is that reactive maintenance is undesirable; planned preventive maintenance (PPM) is “the answer”. That paradigm fails to put people at the centre. Times have moved on. The thinking here challenges the public-sector “think big” command economy based approach, and aims to examine new ways ahead. The purpose of this paper is to summarise a range of new approaches and identify common threads. People are an organisation’s greatest asset; the maintenance and enhancement of their working and living environments and their wellbeing deserve serious attention.

**Design/methodology/approach** – The research is based on semi-structured interviews with maintenance and facility managers in organisations noted for their tendencies to innovate in their core business. The paper aims to assist maintenance and facility managers to review their building maintenance priorities in relation to user wants and needs.

**Findings** – While the study is insufficient at this stage to support wholesale change in practice to any one new approach, a professional approach to the expenditure of considerable sums on building maintenance suggests that appropriate time should be spent in developing and evaluating alternative approaches.

**Originality/value** – Calls for a complete re-think on the approach taken to maintenance.

**Keywords** Customer service management, Facilities, Innovation, Maintenance programmes, Preventive maintenance

**Paper type** Research paper

## Introduction and background

Cinderella went to the ball, and she won her man, Prince Charming. This is at variance with the impression of building maintenance conjured up by describing it as the “Cinderella” of the construction industry (Seeley, 1976). Indeed, it is suggested that maintenance has “come of age” and is now married to facilities management, and with a change of name to “building care” (Wood, 2003), very “sexy”. Allegory and analogy have their limitations, but maintenance is now clearly big and important business. The output of the GB construction industry on maintenance work in 1969 was reported (Seeley, 1976, p. 2) as representing 28 per cent of the total construction output. Around 30 years later, the Barbour Index (1998) reported quite a change, estimating the UK market for MRI (maintenance, repair and improvement) to be worth £28bn, compared with £10bn for new-build. There is also growing discussion of the value of maintenance in relation to both the initial, capital cost of a building and to the costs and value of the operations carried out in the building over its lifetime.

Evans *et al.* (1998) produced a study of costs of owning and use of buildings for the Royal Academy of Engineering. From this has come the 1:5:200 ratio (relating initial costs to maintenance to costs of operations) much repeated by, for instance



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Richard Saxon (2002) of the multidisciplinary Building Design Partnership, and Chairman of Be (Collaborating for the Built Environment). Clements-Croome (2000) brings together a number of papers on how buildings affect productivity. Hughes *et al.* (2004) “exposes the myth” of the 1:5:200, questioning the figures and the basis on which they were derived. Such assessments assist in promoting the value of buildings and their maintenance rather than focusing only on costs.

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Standards, definitions and expectations develop and change over time. For example, BS 3811: 1964 (British Standards Institution, 1964) defined maintenance as “Work carried out to keep or restore every facility, i.e. every part of a site, building and contents, to an acceptable standard”. By 1991, BS 4778, part 3, Section 3.2 (British Standards Institution, 1991), had refined this to “The combination of all technical and administrative actions, including supervision actions, intended to keep an item in, or restore it to, a state in which it can perform a required function”. Every term is contestable: for example, “intent” – who decides the “required function” and whether or not the item can, or does, perform adequately?

### Changing priorities

In the years immediately following the Second World War, there was a great focus on reconstruction, with a related need to produce the greatest number of dwellings from the available funds. This gave rise in the UK to the building of large numbers of new houses on estates on the edges of towns, and in “new towns” such as Harlow, Hatfield and Hemel Hempstead. Over a period, attention moved from replacement of bombed-out houses to “slum clearance”, removing unhealthy, overcrowded tenements in the industrial towns and cities and providing spacious new houses with gardens in the “suburbs”. The Parker Morris report of 1961 (Parker Morris Committee, 1961) accompanied by design guidance in the then Ministry of Housing and Local Government’s Design Bulletin 6, *Space in the Home* (Ministry of Housing and Local Government, 1968) set out design standards, and in 1968 the government incorporated Parker Morris recommendations as mandatory minima through Department of the Environment Circular 1/68 (Department of the Environment, 1968). The 1960s also saw the introduction of financial control via the Housing Cost Yardstick, and in 1965 the first national Building Regulations. This was a time of great “technocratic” involvement, with government advice and control, and programmes prepared, approved and implemented by architects, surveyors and other professionals.

At the same time, the drive for more “bang for the buck” in terms of more dwellings *per annum* in the housing programme promoted interest in the achievement of economies of scale through prefabrication. In the early post-war years this was manifested in the provision of one- and two-storey houses in aluminium or steel frames and panels such as the Arcon, BISF and Hawkesley systems, and concrete panelled systems such as Cornish Units, Laing Easiform, and Unity. The quest for ever-increasing production and productivity was taken further in the 1960s by the then National Building Agency (NBA) through the promotion of “industrialised building” and of “variety reduction” with the publication of *Metric House Shells* (National Building Agency, 1970). This period saw the replacement of “slums” with tower blocks, slab blocks and deck-access blocks of flats and maisonettes in large-panel concrete systems. Then in 1968 a gas explosion blew out a corner of Ronan

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Point, a tower block in the London Borough of Newham, and faith in the “brave new world” of industrialised housing was lost.

The “think big” approach continued, however. The NBA turned its attention to the “modernisation” of the “slums” by addition of new kitchens and bathrooms to people’s existing homes. Design decisions and programmes were still largely determined and implemented by technocrats. However, in 1979, the British people elected a Conservative government under Margaret Thatcher and the emphasis changed. Private provision was preferred, the private sector promoted, and public provision proscribed. Public utilities were “privatised”. Councils’ direct labour organisations, which had previously carried out repairs to the councils’ properties, were required to submit to compulsory competitive tendering to keep any work “in-house”. Council house tenants were encouraged to buy their homes, and many did. This trend from public to private has continued. For instance, in areas in which the public sector is still involved, such as education and health care, the private sector is providing finance and other support. The Private Finance Initiative (PFI) and Public/Private Partnerships (PPP) have given construction-related firms greater involvement in the briefing, design, procurement and operation of buildings. A new profession, facilities management, has been created. At the same time, issues such as quality, choice, customer care, service and sustainability have come onto and risen up the agenda.

### Research design

The public sector in Britain has long benefited from a culture of official advice and guidance, and sharing of experiences, good and bad. This may be considered both a blessing and a curse. The National Building Agency, referred to above, was set up by government in 1964 to assist public sector professionals; it was closed by government in 1982. The Building Research Establishment continues, though it has a “framework agreement” with government for a programme of research and no projects: it is obliged to seek private commissions and to charge market prices for its advice and publications. The Audit Commission continues to inspect and provide advice to public authorities. In 1986 it published *Improving Council House Maintenance* (Audit Commission, 1986), in which it promoted the virtues of planned preventive maintenance (PPM) programmes. For some time local authorities were expected to demonstrate in their submissions for Housing Investment Programme (HIP) support (i.e. to be allowed by central government to spend their own funds on their own properties in the way proposed) an appropriate “split” between planned and responsive maintenance. The Audit Commission recommended that authorities should achieve at least a 60:40 split and aim for 70:30. The Commission continues to measure authorities against that benchmark, and to use this as a criterion in determining the effectiveness of an authority’s service delivery.

This paper reports on research undertaken on a hypothesis that PPM programmes, being based on a firm and logical foundation, would be widely present and effective in both public and private sectors. It was also posited that it would be possible to identify and share good building maintenance practice. A number of “beacon councils” were visited. Local authorities were invited by government to apply for “beacon council” status in 2000, and ten were awarded that status for their housing maintenance service. A further ten achieved beacon status in 2004. In addition, a number of companies were visited that were identified as having a record of innovation in their field. It was

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believed that these organisations would be likely to have building maintenance operations of interest, and further that they would be good exemplars of the PPM approach.

Semi-structured interviews were carried out with appropriate personnel, using an aide-memoire of seven topic areas. These examined:

- the interviewees' background and involvement with maintenance, and the size of the operation;
- how priorities are determined;
- the involvement of building users;
- approaches to planned maintenance and to responsive maintenance;
- relationship to design, automation, sustainability and other issues to be considered; and
- anything else deemed pertinent.

Interviewees were encouraged to share their practices together with their rationale and reflections on their effectiveness, identifying practices which they believed to be particularly innovative or effective. All interviewees were offered anonymity in any resultant publication. A problem which arose and could perhaps have been anticipated was that some private sector companies were unwilling to share information about their practices, in as much as these contributed to their "competitive advantage" (Porter, 1980).

### Findings

An early finding from the private sector interviews was that PPM did not have the significance expected. A number of innovative practices were identified, and some of these have been published by the author already, such as:

- just-in-time maintenance (Smyth and Wood, 1995);
- intelligent building maintenance (Wood, 1999a);
- call centred maintenance (Wood, 1999b); and
- sustainable building maintenance (Wood, 1999c).

To assist discussion here, these may be characterised thus:

- *Just in time maintenance* was defined as "getting the maximum life from each building component and piece of equipment, leaving repair or replacement until the component is broken or fails to function yet taking action prior to it having a serious effect upon the performance of the organisation" (Smyth and Wood, 1995, p. 119).
- *Intelligent building maintenance* is about more than "gizmology". While technology enables building services to be monitored and controlled by sensors (an "automated building"), the application of intelligence implies a more thoughtful response. This involves the identification of information from data, relating it to the creation of comfortable environmental conditions for building occupants.

- *Call centred maintenance* identified the key role of the call centre in providing a responsive maintenance regime. The process requires the call receiver (who may be at a remote location, perhaps in another country) to identify from the caller, using a script and “repair finder” software, the precise nature of the problem and to call up an appropriate response. An appointment is made and the operative booked online. The service may be related to a service level agreement (SLA) which sets time-scales within which the work should be completed.
- *Sustainable building maintenance* applies to maintenance operations considerations of both the sustainability of the building and sustainability of the operations. As indicated in the Introduction to this paper, the costs of maintenance and operation of a building are several times greater than the initial construction cost. It therefore makes sense to consider investing in more expensive materials and components if they are more durable. However, much work carried out on buildings in use relates to changing use and “fashion”, so projected long-term savings may not be realised.

In all the above cases, collection and analysis of data allows the refinement and redefinition of service levels and service life, with a focus on meeting the needs and expectations of today and tomorrow. One client, for instance, had been able to negotiate reduced attendance times with consequentially lower prices and a longer contract on the basis of records of service times actually achieved.

By contrast with the largely private sector examples above, where the emphasis is more on the provision of a maintenance service responsive to the wants and needs of the building user and less on recourse to PPM, the public sector participants tended to have substantial PPM programmes. Perhaps this was related to the selection of “beacon councils” for the study. None of them had a rating from Audit Commission inspection of less than “good” (several were “excellent”) and analysis of the reports confirmed that inspectors remarked favourably upon the proportion of work carried out as planned maintenance.

However, public sector organisations were also very assiduous about public consultation on their proposed plans. One authority, for instance, had modified its plans to bring forward the more visible works. Funds go a lot further on repairs and replacements of paths and fences than when spent on new kitchens, heating and electrical upgrades. This also helped secure more “buy-in” to the district-wide programme, where otherwise some estates may have had little or no work planned for several years. Works were also designed specifically to avoid decanting of tenants/residents/clients (unless they preferred), to minimise disruption generally, and appointments negotiated. Where possible, choice of colour or arrangement was offered within budgets, and the scale of the operation had brought cost-benefits that allowed higher specifications than previously.

Another authority had invested in the provision of palmtop PDAs (personal digital assistants) which enabled maintenance operatives if they wished, and with suitable training, to obtain schedules and to record work done online. Operatives were also empowered to undertake additional work identified at the premises, with an upper limit on expenditure.

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### Conclusions and next steps

The examples of maintenance practice identified demonstrate a professionalism in the industry that is at significant variance from the image created by reference to Cinderella and to cowboy builders. The diversity of practice also suggests that maintenance managers are thinking and acting more strategically, and not just implementing the “received wisdom” of others. However, there is a perceived need for greater sharing of good and innovative practice. This is needed to help promote greater consideration of alternatives generally, and more particularly in the public sector, to promote greater acceptance of diverse practice.

It may be that benefits that may derive from more innovative and responsive maintenance approaches in the public sector are not being seen, or that such innovation has been discouraged by the declared preference for more planned maintenance. Evidence suggests, however, that many managers are open to change. The need to “resist” or respond to privatisation has promoted greater interest in identifying and meeting the needs of users. Closer relationships are being formed and fostered between service provider and customer in both public and private sectors. There is recognition that who provides the service and its cost is less important than the service that is provided and its quality.

Attention is also being given to longer-term matters, such as the provision of more durable components and their “alignment” with life expectancies of the building into which they are incorporated. Although work is being done, especially in the private sector in relation to PFI/PPP projects, whole life costing (WLC) is still as much an art as it is an imprecise science. Life expectancies are still more easily determined for existing (or previous) materials and ways of working than they can be anticipated into the future. The need for PFI/PPP contractors to bear the costs of building maintenance for the duration of the contract, maybe 20 or 30 years, makes it vital that they develop ways of estimating more accurately the scale and scope of the maintenance obligation. The collection and analysis of relevant data is an important component of this assessment and can be used to inform both contractor and client, and to generate a “whole life” or “cradle-to-grave” model.

Technology is available, and is being used, to monitor the performance of buildings, to initiate and record maintenance operations and to evaluate their effectiveness. This is enabling the building up of profiles of maintenance, which could over time help to generate fuller and more accurate pictures of maintenance needs. Perhaps thereby it may become possible to reduce the scale or frequency of maintenance interventions and/or improve the quality of service the building provides to the user. The ability, for example, to improve service level agreements over time, as both client and service provider develop increased confidence, trust and reliability, has been demonstrated.

Across the whole, a need for enhanced skills in terms of management, strategy development, forecasting and customer care is apparent. This will impinge upon the education and training of the maintenance and facilities managers of today and tomorrow, with specific reference to curriculum and CPD needs.

The study is not complete – in a sense it will never be, in that maintenance practice continues to develop and change. In this sense, maintenance is more diverse and interesting than the texts and guidance of the late twentieth century suggested. Maintenance is sexy; Cinderella has graduated from sweeping the grate to managing the palace.

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