Bond University
ePublications@bond

Mirvac School of Sustainable Development

Institute of Sustainable Development and Architecture

6-18-2008

Better strategic procurement for maintaining schools: An Australian context

Jim Smith
Bond University, jismith@bond.edu.au

Brian Wood

Follow this and additional works at: http://epublications.bond.edu.au/sustainable_development

Part of the Other Architecture Commons

Recommended Citation
Jim Smith and Brian Wood. (2008) "Better strategic procurement for maintaining schools: An Australian context".Jun. 2008.

http://epublications.bond.edu.au/sustainable_development/8

This Conference Paper is brought to you by the Institute of Sustainable Development and Architecture at ePublications@bond. It has been accepted for inclusion in Mirvac School of Sustainable Development by an authorized administrator of ePublications@bond. For more information, please contact Bond University's Repository Coordinator.

Better Strategic Procurement for Maintaining Schools: An Australian Context

Jim Smith[1] and Brian Wood[2]

[1]School of Sustainable Development, Bond University, Gold Coast, Queensland, Australia.
[2]Oxford Brookes University, Oxford, UK.

Introduction

All clients or practitioners involved in the construction and care of buildings and facilities recognize that the organization and delivery of maintenance is important if it is to be carried out in an effective and timely manner. However, in many organizations it is deferred, ignored or just forgotten until it becomes an urgent matter where action is demanded due to failure or breakdown.

In common with many client organizations with a large portfolio of properties the Department of Education and Training in Victoria, Australia, is developing strategic models for better managing the maintenance in its schools. To gain an appreciation of the maintenance task it faces the Department has nearly 1,700 primary and secondary school campuses spread across the state and in the Melbourne metropolitan area, covering an area approximately the size of the UK. Identifying and organizing the maintenance of the buildings and the grounds on these schools is a large and complex task. At the end of 2005 a school buildings maintenance audit in the state of Victoria involved three principal contractors, 52 individual auditors inspecting 6.8 million square metres of floor space in 26,600 buildings. The maintenance audit was completed by mid-2006.

This audit, together with previous ones in 1997/98 and 2000/01 provide details of the condition of all building elements, many sub-elements, external works and services for all government schools, together with an assessment of any immediate future works that may be required to maintain the facilities in a serviceable condition to allow them to function effectively. The results highlighted the need to develop better models for organizing maintenance in the future to reduce the steadily increasing backlog starting to accumulate in all schools across the system.

This paper summarises the potential procurement strategies for managing maintenance in the whole range of its school buildings. It begins with the basic definitions and types of maintenance and then reviews the various approaches that a range of authors have suggested for this environment.

Definitions of Maintenance

United Kingdom

The British Standards (BS) provide the basis for defining the essential components and characteristics of maintenance and terms associated with maintenance and quality management. In British Standard 3811: 1984, *Glossary of Maintenance Management Terms used in Terotechnology*, maintenance is described as, ‘a combination of any actions carried out to retain an item in, or restore it to an acceptable condition. BS 8210: 1986 (*Quality Vocabulary: Availability, Reliability and Maintainability Terms*) takes this definition further by characterizing *building maintenance* as ‘work, other than daily and routine cleaning, necessary to maintain the performance of the building fabric and its services’. The important

dimension of maintenance management is taken up in BS 4778, Part 3, Section 3.2: 1991 where it describes maintenance as, 'the combination of all technical and administrative actions, including supervision actions, intended to retain an item in, or restore it to, a state in which it can perform a required function'.

The classification of maintenance into categories is taken up in BS 8210: 1986, where p*lanned maintenance* is described as, 'maintenance organized and carried out with forethought, control and use of records to a predetermined plan … based on the results of previous condition surveys'

In BS 3811: 1984, the second category of maintenance, *preventive maintenance* is defined as, 'maintenance carried out at predetermined intervals or to other prescribed criteria and intended to reduce the likelihood of an item not meeting an acceptable condition.

An interesting strategic and organizational dimension to maintenance and the provision and support of functions and spaces is provided by Wood (2003:102) where he expands the practice of maintenance to embrace b*uilding care*, which is, '… the pursuit of the enduring supply of the best environmental conditions in which to support the corporate objectives of the organization'. We will return to this concept later when we consider the potential strategic approaches to maintenance and the broader objective of building care.

Australia

An interesting source for guidance in Australia is the Burra Charter[1], which was adopted by the Australia ICOMOS in 1979 (revised 1981 and 1999) and provides ' guidance for the conservation and management of places of cultural significance …'. Maintenance is narrowly defined in this document as meaning, 'the continuous protective care of the fabric and setting of a place, and is to be distinguished from repair. Repair involves restoration or reconstruction'.

In a school buildings setting the Department of Education and Training in Victoria, Australia has defined maintenance in a broader sense to include repair and some minor reconstruction where it means, 'the activities that may be required now or in the foreseeable future to ensure an element/sub element is in a serviceable condition that fulfils its original design intent' and 'is directed to keeping the building services and grounds in a suitable condition or repair (sound working condition) appropriate to their function, not necessarily new, but not unduly compromising functionality' (*Physical Resource Management System (PRMS): Maintenance Assessment Guidelines*, 2005:16). Activities may therefore include repair, repainting and partial or total replacement.

A number of authors have categorized and classified the various forms of maintenance (Lee and Wordsworth (2000) and Chanter and Swallow (2000) and a good summary of the various maintenance categories is given by Langston and Lauge-Kristensen (2002) where they state that, 'Maintenance can be reactive or proactive. Nevertheless, there are only three ways of maintaining buildings:

1. *Corrective (unplanned) maintenance* – the day-to-day work caused by unforeseen breakdown, damage or emergency.
2. *Predictive maintenance* – planned repairs made on the basis of measured reductions in operating performance that herald future failure.

[1] The Burra charter is based on the International Charter for the Conservation and Restoration of Monuments and Sites (Venice, 1964), and the Resolution of the 5th General Assembly of the International Council on Monumments and Sites (ICOMOS) (Moscow, 1978).

3. *Preventative maintenance* – planned repairs to restore elements or services to an acceptable standard, including routine cyclic work.'

As for the importance of each type in practice Pye (1999) has found that in the UK environment the majority of maintenance is still focused on corrective (unplanned) with over 61.3%, with the planned categories in the minority with preventative at 34.0% and the lowest being predictive at a measly 4.7%.

Benchmarks for Maintenance in Australian Schools

The National Public Works Council[2] (NPWC) (1993) *Predicting Schools Maintenance Costs* is a study that suggests, 'The conclusions from this study show that there is no "mythical" percentage which can be applied Australia wide to assess the level of funds required for the maintenance of schools. There is, however, a range of percentages, which reflect the differing design criteria, maintenance approaches, age and condition of school assets, geographical and environmental factors'.

A model was developed that, '… identified technical activities that have to be undertaken in order to keep a building adequately maintained over the long term (100 years), when they are needed, and what they should cost, given current expectations as to the levels of service provided' (NPWC, 1993:3).

Using the NPWC (1993) model the '…average estimated funding requirements for the period 1991 to 2010 ranged from 0.9% to 2.8% of the building replacement value. The results have been summarized in (the Report's) Figure 1.

These statistics demonstrate the levels of expenditure that should be required to maintain the schools in each such environment'. So, for instance, Western Australia had the lowest requirement for maintenance to the building fabric at 1% of the replacement value of the school and Tasmania and South Australia as having the largest requirement for fabric maintenance at around 2.25%. The funding requirements for services maintenance is lowest in Victoria and Western Australia at around 0.25% with the Northern Territory with the highest need of around five times greater at around 1.25%. With Victoria being the focus of this work it is interesting to note that Victoria is shown as with an estimated annual maintenance requirement from 1991-2010 of 1.75% of replacement value for the fabric of the Buildings. That is, the second lowest of any states analysed.

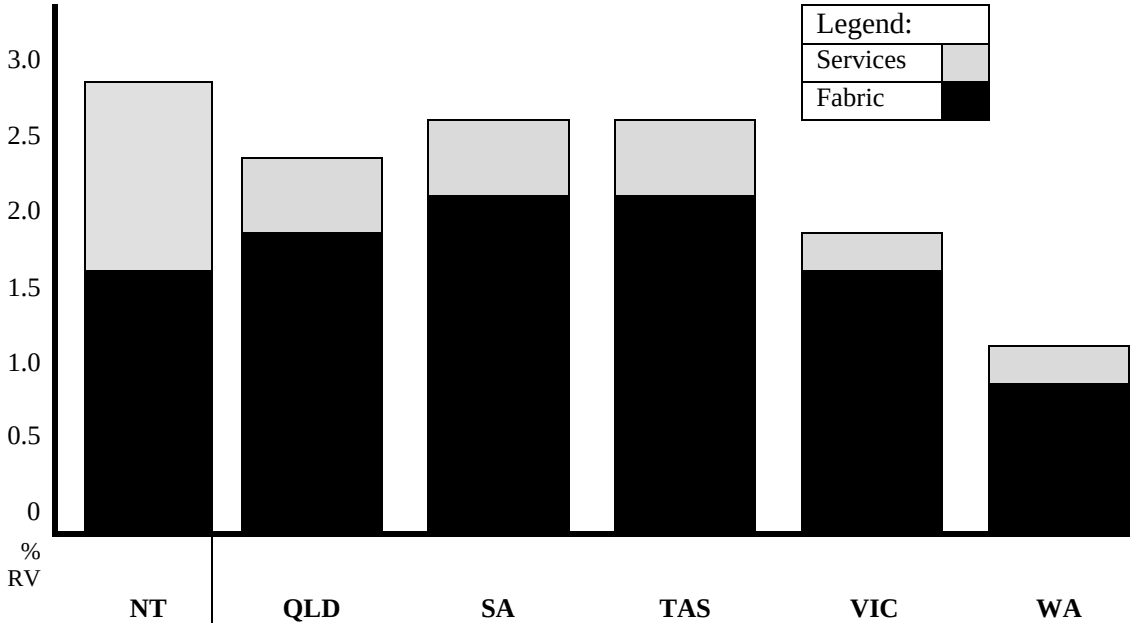
The Report was realistic about gaining adequate funding for maintenance and also sounded an ominous warning if the states were unable to properly fund or neglect the maintenance needs of its school buildings (NPWC, 1993:2).

> The implications of the funding that the results showed to be required in order to keep their schools facilities at the intended level of service should be reviewed by the Authorities. Judging by recent experience elsewhere, it is probable that the required levels of funding will prove to be higher than recent budget allocations. If so, the implications are:
>
> (a) an opportunity to present better cases for more appropriate funding, or
> (b) to accept:
> - a build-up of maintenance backlogs, adding to future funding needs;
> - a wastage of assets which, though not always brought to account is none the less real, and

[2] The National Public Works Council (NPWC) was founded in 1967 and became the Australian Procurement and Construction Council Inc (APCC) in the mid-1990s. The APCC has established itself as a national reference point for both government and industry on best practices, principles and emerging issues in procurement, construction and asset management disciplines.

- a decline in the service provided by schools buildings.

Figure 1 Estimated Annual Maintenance Requirements, 1991-2010, Six Authorities



Source: Adapted from NPWC (1993) *Predicting Schools Maintenance Costs*, page 3.

Legend
- (% RV = Percentage of Total Replacement Value)
- NT = Northern Territory; QLD = Queensland; SA = South Australia; TAS = Tasmania; VIC = Victoria; WA = Western Australia.

In the UK, Spedding (1992) is one of the few authors to document maintenance and capital cost s of schools. In his research paper, he notes that when comparing maintenance costs, 'Changes in intensity of use and long term under funding of maintenance in many counties means that the consequences for maintenance and running costs are significant. The fact is that buildings built for, say, 240 pupils frequently had to accommodate many more pupils at the height of the boom, thus increasing wear and tear at that time, and buildings intended for at least double that number may have less than half. Therefore, the expression of maintenance costs, as costs per pupil cannot, in many schools, be considered as a simple relationship. Similarly, the expression of cost related to area is likely to be flawed' (Spedding, 1992:5).

Table 1 shows the cost of a 5-year program of building maintenance averaged to 1980 prices per annum for 60 typical schools, sampled in proportion to their relative numbers in a county council's stock of buildings.

Table 1 UK Schools: Maintenance Costs per annum

	Number in Sample	**Average cost per annum £ (1980 Prices)**		
		Per School	Per Pupil	Per sqm
Primary Schools	50	£ 3,239 (=A$7,874)	£ 17.80 (=A$32.72)	£ 3.10 (=A$7.44)
Secondary Schools	10	£ 22,377 (=A$53,605)	£ 21.30 (=A$51.12)	£ 2.60 (=A$6.24)

Note: Exchange rate of 1£ = A$ 2.40 used.

Spedding commented on the wide gap between the maintenance costs per annum *per school* with, '… the maintenance cost expressed as per school shows that primaries cost, on average, one-seventh of secondaries. The figures show less variation between costs per pupil in that primaries cost over three-quarters of the secondaries'

However, for the other unit comparisons the range was not so large. For instance, in 1980 prices the schools' authorities maintenance unit spending *per square metre* was around £2.60 to £3.10 per square metre per annum for primary and secondary schools (= A$6.20 to A$7.40 per square metre). The building cost indices in the UK have risen +150% for the period 1980 to 2006 and in Australia by +340% in the same period. Taking the lower percentage (+150%) these costs per square metre on present date prices would be in the region of £6.50 to £7.75 (= A$15.50 to A$18.50) per square metre per annum.

The Scale of Schools' Maintenance in Victoria

The Department of Education and Training has some 1,621 primary and secondary schools with 1,739 campuses spread across the state and in the Melbourne metropolitan area. Identifying and organizing the maintenance of the buildings and the grounds on these schools is a large and complex task.

A critical factor in assessing the type and extent of maintenance on each school property is the management and updating of the Department's schools property database, *Schools Maintenance System (SMS).* The assessment of the condition of schools is carried out by the updating of this database by periodic audits. Audits were completed in 1997/98, 2000/01 and most recently at the end of 2005. These audits provide details of the condition of all building elements and external works for all government schools, together with an assessment of any immediate future works that may be required to maintain the facilities in a serviceable condition to allow them to function effectively.

An independent experienced inspector familiar with maintenance work and activities carries out the audit. The auditor works closely with the regional offices and schools, but the assessment is an independent one where they are required to identify works and priorities in accordance guidelines published by the Department in its *Schools Maintenance System (SMS): Maintenance Assessment Guidelines* (August 2005), prepared by Sinclair Knight Merz Pty Ltd.

The costs for maintenance work identified by the audit are automatically costed by the Physical Resource Management System (PRMS). A schedule of rates assesses the costs of repair, rectification or replacement works for all the common maintenance items. These costs have been assessed on a consistent basis by a firm of professional quantity surveyors and these estimates are integrated into the software to automatically price or cost each maintenance item on the database.

Thus, at the end of the audit the system can provide detailed costings of each maintenance item within a school and integrated costings for a region and the whole state broken down into elements and condition, priority classifications and other categories, if necessary.

Results of the 2005 Audit

After the audit was completed in late 2005 the Department was able to use the audit results in the Department in its *Schools Maintenance System (SMS)*, which was integrated with *School Asset Management System (SAMS)* and the standard costings to provide data, statistics and detailed cost analyses based on the following major variables or criteria:

- All Building elements
- Condition (Poor, Worn, Fair) and priority (A, B, C, D)
- Planned and Unplanned/Ineligible
- Specialist work
- Region / schools

The audit data has allowed various and detailed analyses to be carried out, but these are not included in this paper. Departmental analyses have focused on work in all the conditions (poor, worn and fair) and priorities (A,B, C and D) noted above

The total of all three categories of maintenance (Poor, Worn, Fair) under the four condition categories (A, B, C and D) were evaluated in the 2005 audit with an early 2006 school review update as nearly $250 million. From this figure it can be seen that a backlog of maintenance has been allowed to build up over a number of years where annual funding allowances of around $25-30 million do not reflect any attempt to make inroads into this amount due to neglect.

Managing Maintenance in the Future

To overcome this maintenance backlog requires an approach that will address the problem whilst delivering a good value technical and financial solution. Aggregating the maintenance items that need attention, using the data collected by the maintenance audit and placing them in appropriate packages of work that will attract keen competition and innovation is the challenge facing the Department or any other organization with a similar problem. There is a need to develop an approach that will reduce the present level of maintenance and to ensure that future levels of funding and procurement do not allow the maintenance situation to deteriorate to the levels we presently see in the system.

Grouping of work rather than tackling each individual item of work should bring benefits of continuity of work, economies of scale and gaining the skills of a better organized maintenance contractor. Nevertheless, organizing and managing maintenance on this scale is difficult task. Wood (2003:71) has recognised the problems of maintenance procurement, ‘ … because of its inherent uncertainties in terms of scope and scale of work, the unpredictability of when emergency work may arise and complications of access, often involving disruption to occupants and their operations, contract arrangements have often been looser.’

Procurement Systems applicable to maintenance

Traditionally, when maintenance can be aggregated into reasonably sized contract packages within the whole range of procurement methods available a number have been favoured and used by larger client organizations. These include lump sum, term and cost plus contracts and several authors have commented on their suitability to different circumstances. These are not discussed in this paper.

The environment for maintenance tendering and procurement has changed in the last ten years. With the move towards a corporate real estate approach to property ownership and use, clients and their advisors have sought more effective and efficient means to carry out their business activities. This has had some effect on the maintenance and care of property assets. For instance, Wood (2003:77) points out that, … a developing ‘professionalisation’, together with the changing managerial context of organizations working through concepts such as

‘return to core business’, ‘downsizing’ and ‘outsourcing’, has brought the cost of property, including maintenance, into the spotlight’.

The change in the maintenance environment has meant different types of organization are entering the maintenance market to offer their well-honed skills to clients with large property holdings. Again, Wood (2003) has identified this trend and he states that, … contractors are also seeing building maintenance work being awarded to companies based in or coming from other sectors, such as security, cleaning or catering, with clear customer orientations and used to meeting expectations of service quality and reliability not always associated with ‘builders’ Wood (2003: 77).

In fact, the new trends of maintenance procurement are disturbing the *status quo* of the maintenance classifications in corrective (unplanned), predictive and preventative. A new approach based on ‘just-in-time’ (JIT) management principles seems to be favoured by many large client organisations. It is an abandonment of preplanned maintenance in preference to just-in-time maintenance where the emphasis is placed on the avoidance of defects rather than on their detection and correction. JIT maintenance borrows its mode of operation from JIT manufacturing and delivery. JIT maintenance relies on an approach called “predictive maintenance’ (Muhleman, et al, 1992), where changes in the condition of equipment and function give timely warning of approaching failure. JIT maintenance relies on an approach called “predictive maintenance’ (Muhleman, et al, 1992), where changes in the condition of equipment and function give timely warning of approaching failure. Smyth and Wood (1995) in Wood (2003:91) defines JIT maintenance 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 on the performance of the organisation’.

Wood (2003) again has spotted this trend and suggests this new approach is, ‘… an abandonment of preplanned maintenance in favour of just-in-time maintenance where the emphasis is placed on the avoidance of defects rather than on their detection and correction’ Wood (2003:49-62). Wood’s research (Wood, 2003) into the UK food retail sector found support for the possibility and incidence of JIT maintenance, whereby prescheduled work was increasingly being replaced by a call-out just sufficiently in advance or at the time of it affecting the operations of the client. Subcontractors were carrying out this work where demand response times were critical and linked to the payment of the subcontractor. Those entering this business were both the traditional contractors and contractors from a security and an industrial cleaning background who were growing the ‘facilities management’ operations. So, with the JIT approach there is a blurring of the distinction between corrective, predictive and the preventative as we once understood them.

Maintenance Management Models

The present system of maintenance in schools in Victorian schools has been manifestly under-funded and has resulted in a massive backlog of poor condition maintenance items as demonstrated by the Audit survey conducted in late 2005. School maintenance in Victoria has all the characteristics of deferred maintenance, where insufficient funds are made available. Deferred maintenance is, ‘a frequent victim of budget cuts or pruning of programs; it is more usually seen as discretionary spending rather than as investment. What is implied by deferred maintenance is an acceptance …of a reduction in performance or perhaps a substitution of a planned maintenance by a maintenance of an emergency kind at an uncertain and maybe inconvenient time.’ (Wood, 2003: 8).

In common with many organizations the Department must make inroads into the maintenance backlog that has now been identified by considering new funding and organizational

maintenance models that will prevent this situation arising again. However, there must be an injection of funds into schools maintenance to overcome the backlog that has developed over decades. In the immediate future, there will also be a need for greater funding than the present model to at least keep pace with the accruing maintenance in all schools. To keep pace with maintenance accrual the schools annual maintenance budget ought to doubled to $50-60 million (with no leakage to other programs). In addition to this commitment it would be necessary to review the methods and arrangements used to deliver maintenance and related services to schools. That is, rather than consider it purely as a maintenance function, the Department should be organizing maintenance as a facilities management service more aligned to the type of integrated service described earlier.

Following the guidance given in the NPWC (1993) *Predicting Schools Maintenance Costs* Report given earlier to demonstrate the levels of annual expenditure that should be required to maintain the schools then a percentage of 1.75% of the replacement value should be applied *Victoria.* With an estimated buildings replacement value from the Department of around $10,000,000,000 ($10 billion) then an annual figure of $175 million ought to be spent on maintenance. On present maintenance assessment values from the 2005 audit such a figure would clear all Poor and Worn condition maintenance items from all schools ($115 million) and still have $35 million to make considerable inroads into the third level of maintenance items in the 'Fair' category of maintenance. To clear all these items of maintenance would place schools and the Department in a good position to develop a better strategic approach to ensuring such a backlog of maintenance did not occur again.

Making Progress Towards Better Strategic Models of Maintenance in Victoria

The message from the material presented is that with present levels of funding the Department is not clearing its maintenance backlog through its corrective (unplanned) maintenance approach. In fact, with present levels of funding (effectively $27 million annually) maintenance levels will continue to increase as the existing school building stock ages and new schools are added to the stock. The 2005 audit total of nearly $250 million shows that with this level of funding projected into the future it is not enough to cope with the additional maintenance items being added to the list of total maintenance. In addition, new school buildings are being added to the building stock, but the Department is not replacing existing schools (particularly those in poor condition) quickly enough. As we have noted and over time, the value of all maintenance will continue to grow and more items will be added to the 'Poor' category as the 'Fair' and 'Worn' Categories deteriorate through lack of attention. Therefore, the present method of funding maintenance is unsustainable and maintenance will have a negative impact on the function and performance of activities within Victorian schools.

It should also be noted that a reasonable proportion of the capital works, especially that part providing renovations, extensions and upgrading of existing schools in effect is removing many maintenance items from the schools receiving these capital works. Some members of the Schools Resources Division assess the proportion of capital works that goes into rectification and maintenance works of this kind as in the region of 15-20% of the capital works budget. To accurately calculate this figure and contribution to maintenance in schools a study is needed that investigates and analyses a sample of these types of renovations and extension works to existing schools to verify the type and extent of maintenance work in such projects.

The Department also needs to commence an integrated program of whole life cost studies on its new generation schools in particular. The new schools designed and built in the last five years should be investigated and analysed over their lives with costs (running and capital) and types of maintenance required over time. Sustainable features now incorporated into these

new designs should also be studied for their effectiveness and to check whether they provide value for money that has been invested in them. In this way, bad design features and functional arrangements should be designed out of new projects and high value sustainable approaches should become a standard part of new schools design.

Conclusion

Taking account of the literature and the new models proposed in this paper the authors suggest movement away from the deferred maintenance model presently operating in Victoria to increasing levels of investment to achieve, "… '*a fit for purpose school estate, efficiently delivered and managed*', where fitness for purpose is measured in terms of the sufficiency, suitability and condition of the education accommodation" (Department of Education and Strategic Investment Board Ltd, Northern Ireland).

Victoria has investigated new maintenance approaches and anticipates its program as an integrated facilities management service providing building care on the model espoused by Wood (2003) with his JIT approach to maintenance and customer service. Whilst Wood envisaged his model to be more likely to be adopted by the corporate sector, authorities such as Victoria included it as a strategy for its schools sector, adopting world's best practice.

Progress toward this model will probably have to be achieved in stages, with the most critical stage being the clearing of all significant maintenance items under the Poor Condition category and many of the Worn category as well. This then provides a new base for the development proposed in Figure 3. This Figure shows the spectrum of development from the existing status quo situation, to overcoming the backlog of maintenance with an injection of new and significant funding. Then the schools system has the ability to proceed to the next stage, regional organizations for maintenance and possibly a broader inclusion of facilities management. Progress towards Wood's JIT Building Care model then becomes feasible where maintenance is seen in the broader perspective of customer or community service, probably still based on the regional model it supplants. Finally, the strategic partnering for new schools and their care is at the upper end of the model and these building would become the responsibility of the regional or building care models as appropriate.

At the extreme end of the spectrum with the greatest change are placed an approach of developing new schools under a public and private partnership (PPP). Such an approach would leave the Principal and staff free of the responsibility of maintenance (as they are increasingly expected to under the present approach of corrective maintenance) and to focus on their primary responsibility, teaching and management of the school and its students. The PPP schools under these arrangements would be owned by the Department and leased to the school under a service agreement. The service agreement would guarantee the level and quality of facilities management and maintenance provided by the PPP provider for the leased spaces. If the school did not require certain spaces due to falling enrolments or other reasons then they could save money by not continuing to lease those excess spaces. The school could thereby focus on its required and needed spaces, rather than at present, having to maintain all spaces irrespective of their need and priority. Released excess space in this way may then be offered to other users, both within and outside the community, commercial and non-commercial.

There is also the possibility that different options or approaches may be used for new schools as compared with existing schools. For instance, existing schools may retain a basic commitment to the *status quo* approach, but with improved levels of maintenance funding to overcome the backlog of poor condition maintenance items as identified in the 2005 audit. In contrast, new schools could be commissioned on a PPP procurement model with the maintenance taken care of by the PPP life cycle care arrangements. This dual approach would

ensure that new schools would have adequate levels of maintenance built into their future care by the PPP contract arrangements. Over time the proportion of well-maintained schools would increase for the benefit of future maintenance funding requirements.

PPP approaches may also adopt two methods of managing school involvement in the process; one approach with high levels of school involvement, the other with none or very little school involvement.

References

Australia ICOMOS Incorporated (1999) *The Burra Charter: The Australia ICOMOS Charter for the Conservation of Places of Cultural Significance*, Australia ICOMOS, Deakin University, Burwood, Victoria, Australia.

Australian Procurement and Construction Council Inc (2001) *Asset Management*, APCC, Canberra.

British Standard (BS) 3811: 1984, *Glossary of Maintenance Management Terms used in Terotechnology***,** HMSO, UK

British Standard BS 8210: 1986 (*Quality Vocabulary: Availability, Reliability and Maintainability Terms*, HMSO, UK

Chanter, B and Swallow, P (2000) Building Maintenance Management, 2nd edition, Blackwell Science, Oxford.

Department of Treasury and Finance (2006) *Project Alliance Practitioners' Guide*, Government of Victoria, Melbourne.

Department of Education and Training, Victoria (August 2005) *Physical Resource Management System (PRMS) Maintenance Assessment Guidelines*,

Langston, C and Lauge-Kristensen, R (2002) Strategic Management of Built Facilities, Butterworth-Heinemann, Oxford, UK.

Lee, R and Wordsworth, P (2000) Building Maintenance Management, 4th edition, Blackwell Science, Oxford, UK.

Masterman, J (2002) Introduction to Building Procurement Systems, 2nd edition, Spon Press, London.

National Public Works Council (1993) Predicting Schools Maintenance Costs, NPWC, Canberra.

NSW Department of Education and Training (November 2003) *Schools Asset Maintenance Task Force: Focusing on Educational Outcomes*, Final Report.

Price Waterhouse Coopers (March 2005) *New Procurement and Delivery Arrangements for the Schools' Estate*, Department of Education and Strategic Investment Board Ltd, Northern Ireland, UK.

Pye,

Spedding, A (1992) Schools' Design and Maintenance in England and Wales, Construction Papers, No 5, The Chartered Institute of Building, Ascot, UK.

Wood, B (2003) Building Care, Blackwell Science, Oxford.

Wood, B (2005) Towards Innovative Building Maintenance, *Structural Survey*, **23** (4), pp. 291-297.

Figure 3 PROGRESSION TOWARDS BETTER MODELS OF MAINTENANCE AND FACILITIES MANAGEMENT

SPECTRUM OF POTENTIAL MODELS						
LESS CHANGE						**MORE CHANGE**
Status Quo	**Increased expenditure with minor organizational change**		**Clustering Schools for Maintenance**		**New Approaches: Just-in Time Building Care**	**Public, Strategic and Private Partnerships**
CHARACTERISTICS						
Focused on Corrective Maintenance	Focused on Maintenance	Direct Funding to Schools	Direct Funding to Schools Potential for Facilities Management	Department Directed Condition Based Maintenance	School Core Business (Facilities Management With Building Care)	Facilities Management Whole Life Approach
• Deferred maintenance environment • Limited expenditure on Maintenance at $13.5m pa • Backlog of 'Poor Condition' Maintenance items • Expanding list of unattended maintenance items • Surplus space limiting best use of maintenance funds.	• Injection of funds to overcome backlog of Poor Condition Maintenance Items • Places schools maintenance on a sound basis for continuation and improvement • Move towards sound levels of annual maintenance funding aiming closer to the 1.5% of replacement value per annum	• Option 1 (NSW) • Principal directs maintenance	• Option 2 (NSW) • Regional Asset Management Unit (AMU) supports aggregated regional groupings • Principal directs maintenance • Group contract arrangements • Maintenance performance benchmarking • Regional maintenance & FM skills developed. • Maintenance & FM partnerships can develop • Encouragement of consortia with non-building providers • Schools deeply involved in process.	• Option 3 (NSW): Preferred option • Regional Asset Management Units (AMU). • Principals to direct priorities	• Aggregated clustered and regional groupings • Customer focused • Intelligent use of technology • 'light touch' management • responsiveness • control down to individual level • compatible with corporate strategic directions • quality & continuity • revolutionary change in attitude required by client and contractors	• Adopt a whole life approach to managing schools • Consistent approach to resource allocation • Benchmarking and performance measurement • Commitment to reactive and preventative maintenance • Considerable specialist skills to negotiate with partners to manage performance and relationships