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Building Infrastructure Asset Management: Australian Practices

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ABSTRACT

Generally, major public funding is invested in civil infrastructure assets. The efficiency and comfort level of expected and actual living standards is largely dependant on the management strategies of these assets. Buildings are one of the major & vital assets, which need to be maintained primarily to ensure their functionality by effective & efficient delivery of services and to optimise economic benefits.

In Australia, billions of dollars are spent annually managing and maintaining built assets. These assets make up the social and economic infrastructure, which facilitate the essential services to public and business. Buildings are one of the prime & fundamental assets, which need to be managed effectively and efficiently to ensure that related services are delivered economically and sustainably.

More structured asset management of building infrastructure emerged from the need to:

- optimise the resources for managing assets;
- deal with increased user expectations;
- respond effectively to possible asset failures;
- deal with aging of assets and asset renewal issues; and
- cope with emerging scenarios including technology advancement and non-asset solutions.

Different government departments including departments of public works, and major councils through out Australia are responsible for managing their building assets. This paper presents a review of their guidelines and policies currently adopted to satisfy their asset management needs.

The objective of the study was to identify potential gaps in current practices & areas needing improvement.

This paper presents a comparative study of Australian practices and guidelines on Buildings Asset Management (BAM). The paper starts with an overview of BAM. Later sections cover current BAM practices and guidelines across different states of Australia and comparison of practices. The paper will also discuss the extent and usage of advanced technologies (information technology & geographical information system) in current practices. The paper concludes with the authors' observations and further research potentials.

Keywords: Building Asset Management, Maintenance of Buildings, Building Infrastructure

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1. INTRODUCTION

Both in developed and developing economies, major public funding is invested in civil infrastructure assets. Efficiency and comfort levels of expected and actual living standards are basically dependent on the management strategies of these assets. A prime necessity is to secure a continuous and sustainable improvement in efficiency of provision and management of such public infrastructure and assets. Buildings are major and vital assets, which need to be maintained effectively to ensure functionality for effective and efficient delivery of services, and to optimize their economic benefits. Despite this need, it appears that buildings may not be receiving the necessary level of attention and care. For example, the American Infrastructure Report Card (ASCE 2001) gave "School Buildings" 'd-' rating, which is below 'poor'. The Australian Infrastructure Report Card (AIRCA 2001) had not considered public buildings in the study possibly due to lack of sufficient data to rate them.

Buildings are complex facilities. They comprise of several components such as structure, services, internal fit-out and finishing, external finishing and external infrastructure that contribute to the overall functionality.

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These different components have varying service lives and yet they are expected to perform satisfactory throughout the anticipated service life of the buildings. Effective management of building infrastructure aims to:

- optimise the budget for managing assets,
- to respond to increased user expectations,
- to provide early warning of asset failures,
- to deal with ageing of assets and asset renewal issues, and
- cope other scenarios including technology advancement and non-asset solutions.

The role of BAM has been defined as the integration of building assets with the requirements of the market they are designed to serve and the efficient and effective use of resources over the whole life cycle of the asset, including procurement, on-going support, rehabilitation and disposal activities (Bromilow 1990; Kyle 2001).

2. AUSTRALIAN PRACTICES

Australian governments, at all levels, are now adopting accrual accounting practices and recording assets in their balance sheets (ANAO 1996). This has resulted in the need for large-scale asset data capture and large-scale investment in information technology. However, it seems that these are being carried out by individual agencies with little or no co-ordination regionally or across the whole of government. A similar situation exists in relation to asset management policies and guidelines. Federal Government organisations such as the Australian National Audit Office (ANAO), the National Public Works Council Inc, and State Government departments (Victoria, Queensland, New South Wales, South Australia, Western Australia, Northern Territory and Tasmania) are major organisations that publish and maintain asset management guidelines and/or manuals.

There is also considerable development and usage of the latest technologies e.g. Internet (web technology), (Geographical Information System) GIS and others in BAM practices in Australia.

2.1 National Public Works Council Inc, Australia

The National Public Works Council Inc (NPWC) is the peak council of the public works authorities of the Australian Commonwealth, State and Territory governments. It assists in the provision of policy advice to government on best practice and best value procurement of infrastructure needs and in the long-term management of infrastructure assets.

NPWC (1996) published their Total Asset Management (TAM) guidelines which promote a life cycle focus and aim to provide a flexible asset management approach to meeting present and future needs using both asset and non-asset solutions. Major aims of the TAM (NPWC 1996) guideline are to:

- reduce demand for new assets by managing demands for services;
- ensure existing assets are properly used and maintained;
- ensure agencies consider non-asset solutions to meet demand of services;
- ensure agencies identify opportunities to share government, private and community assets;
- improve capital and recurrent works budget processes and accountability;
- give agencies greater control of, and financial responsibility for, their assets;
- consider use of the private sector to provide services and infrastructure; and
- ensure the supply of assets suited to their functions.

2.2 State of Victoria

In Victoria, the Office of Building developed and published the guideline "Assessing the Condition of Constructed Assets" (Government of Victoria 1996) to support the Asset Management Series (Government of Victoria, 1995) and help agencies fulfil their budgeting, planning and reporting responsibilities.

The guideline emphasizes improved management techniques, greater accountability and reduction in costs and liabilities. Agencies are responsible for using assets effectively; maintaining assets to appropriate standards; ensuring that assets have the capacity to meet service demands; and budgeting for costs

associated with the acquisition, use and disposal of assets. Therefore agencies need to regularly assess whether assets meet service delivery needs and base decisions on this assessment. In the guideline (Government of Victoria 1996), the procedure for assessment has been divided into three different phases: 'Collect the Database', 'Analyse the Database' and 'Management Reporting'.

The Government of Victoria (Department of Treasury & Finance 2000) also published a Government Asset Management Policy Statement, "Sustaining Our Assets". Its central principle is that service delivery needs (social, economical and environmental) form the basis of asset management practices and decisions. The policy promotes an integrated asset management approach incorporating:

- a whole of government policy framework;
- informed decision-making;
- an integrated approach to planning; and
- accountability, responsibility and sustainability.

It also suggests quantitative and qualitative management measures to evaluate performance. It should be noted that a public works authority does not exist in Victoria.

2.3 State of Queensland

In Queensland, the Department of Public Works (DPW) published the Strategic Asset Management (SAM) guidelines (DPW, Queensland 2002), which describe all activities for managing building assets for optimal outcomes. It documents the responsibilities of public sector asset owners, users and managers, and provides information and direction on all aspects of physical assets throughout their life cycle.

The principles of Strategic Asset Management (DPW, Queensland 2002; NPWCI 1996) include:

- Assets exist to support the delivery of services and SAM within agencies must reflect the whole-of-government asset policy framework;
- Asset planning is a key corporate activity that must be undertaken along with planning for human resources, information and finances;
- Non-asset solutions, full life-cycle costs, risks and existing alternatives must be considered before investing in built assets, and
- Responsibility for assets should reside with the agencies that control them and the full cost of acquiring, operating and maintaining assets should be reflected in agency budgets.

DPW has also developed other asset management support guidelines/tools to assist departments with the implementation of asset management policies and guidelines (DPW, Queensland 2002). The guidelines include risk management, value management, life cycle planning, management of projects, post occupancy evaluation, condition assessment, functionality assessment and ecologically sustainable development. There is also other material like the Continuous Improvement Matrix and the capital investment strategic planning template. Two major policies are the Capital Works Management Framework (CWMF) and the Maintenance Management Framework (MMF), which are also supported by specific guidance and other material (eg the MMF Implementation Assessment System).

DPW also has an asset management system known as the Queensland Building Information System (QBIS). QBIS is an asset register of all government buildings. It has a GIS capability and is targeted for potential improvement into a more comprehensive system called "Building Queensland".

The Queensland Property Management Committee (1998) noted that a number of excellent asset management related policies, procedures, better practice guidelines, decision support tools, and information systems existing in the public sector but were distributed across a number of agencies. This resulted in the development of the Government Asset Management System (Government of Queensland, 2001), a web-based knowledge management system with over 1,550 web pages and in excess of 34,500 hyperlinks to legislation, policies and better practice guidelines (including the SAM guidelines of DPW).

2.4 State of New South Wales

In New South Wales (NSW), the Department of Public Works and Services (DPWS) was responsible for building and infrastructure services for the State. (DPWS is now part of the Department of Commerce). DPWS developed a suite of asset management material including the Total Asset Management (TAM) manual, TAM 2000 policy, Total Asset Management System (TAMS) software (1994), and other Asset

Management guidelines (DPWS, NSW 2001; Government of NSW 2001).

The TAM approach requires asset managers to assess what assets are needed to support successful service delivery with constant reference to Whole of Government planning, the agency's Corporate Plan, and its Service Delivery Strategy. This approach then leads to the development of detailed plans for the management of those assets that are to be acquired, maintained or disposed of.

TAMS is an asset register and management tool to provide a "whole of life" approach to the management of assets, from construction through operation, maintenance, refurbishment and eventual replacement or disposal. It uses a GIS tool (MapInfo) in the building and maintenance module. TAMS (DPWS, NSW 2001) supports integrated management of an agency's assets and assists the agency to plan and budget for its assets, manage asset maintenance, monitor performance and to satisfy accrual accounting requirements (AAS 27) (AASB 1996).

In NSW, Government agencies are now required to incorporate the requirements of the Environmental Performance Guide for Buildings (Government of NSW 2003) in their asset strategies and in subsequent project delivery briefs for buildings. The guide is aimed at achieving the required environmental performance outcomes and deliver lower operating costs for NSW Government buildings.

DPWS uses their Life Cycle Assessment Design Aid (LCAid) (DPWS, NSW 2003) software package (a tool for evaluating the environmental performance of buildings) to help undertake environmental performance assessments to meet the above requirement.

2.5 State of South Australia

In South Australia, the Department of Administrative and Information Services (DAIS) and the Department of Treasury and Finance published a Strategic Asset Management Framework for public assets as a part of an Asset Management Policy Series. The Framework (Government of SA 1999) primarily focuses on benefits for customers and informed decision-making.

The strategy addresses management level issues like government strategies, agency strategies, facility management and work standards with due consideration to life cycle functions at planning, procurement, maintenance and divestment stages. DAIS uses asset management plans, demand management strategies, risk management, life cycle costing, agency asset register/data bases and reporting to improve asset management. It has also published strategic asset management policies; processes and guidelines, which include a project initiation process for capital works, works policy and procedures manual and others.

DAIS is also responsible for the construction, management and conservation of public buildings in South Australia. It uses its Building and Land Asset Management System (BLAMS) as a database containing information on selected land and buildings.

The BLAMS database operates with seven levels of data, which are inter-related. Those are the asset register, the base data, historical financial details, lifecycle costs of site and building elements, hazardous materials register, annual maintenance plans, asset management plans and reports. BLAMS (Government of SA 1989) provides owners and managers with information that will help them:

- Plan and review the allocation of building resources and the acquisition and disposal of land and buildings,
- Maintain an asset register of land and buildings, create annual budgets and project future anticipated maintenance expenditure; and
- Produce comprehensive maintenance agreement tender documents, associated contractual documentation and the technical data sheets for each item covered by maintenance contracts.

DAIS is currently developing a new asset management system.

2.6 State of Western Australia

In Western Australia, the Department of Housing and Works delivers and manages non-residential buildings and infrastructure assets through Asset Management Services (AMS). AMS contracts and manages projects for buildings and infrastructure assets valued at \$300 million and manages over \$80 million of maintenance works annually. AMS (Government of WA 2002) has published guidelines for Asset and Maintenance Planning, Building Skills Policy, Contract Development, Contract Management, Heritage and Precincts, Western Property, Commercial Property and others.

Asset and maintenance planning processes assist agencies to identify their optimum building needs, secure

appropriate funds, and achieve best performance from their building assets to support service delivery. In 1998, the Department of Contract and Management Services (prior to it becoming part of the Department of Housing and Works) also developed a methodology for Building Condition Assessment (Government of WA 1998).

In July 2002, AMS launched an innovative, in-house property and facilities management system, “Western Property”. Western Property (Government of WA 2002) has been designed to:

- Establish and manage a competitive market of capable, pre-qualified service arrangers and a single point of pre-qualification for service providers;
- Make use of the competitive and public nature of the Government Electronic Market (GEM) and enable clients to package and bid work such as routine maintenance, general restoration and minor works through GEM; and
- Achieve efficiencies by using a common works management and data warehouse reporting systems.

3. OBSERVATION AND CONCLUSIONS:

Building asset management is a complex process, fundamentally involving several stages. Adequate methods and tools exist in BAM practices and guidelines for management and decision-making. However, across Australia, aspects of these are spread among different departments and States. There is room for a more co-ordinated and integrated approach.

There appears to be recognition of the need for effective BAM based on the proliferation of BAM policies and guidelines across Australia. It is also observed that there is a drive for a better balance among social, economical, environmental, political and legal issues. Most states have base of service delivery approach and whole of Government planning in their Asset Management Framework.

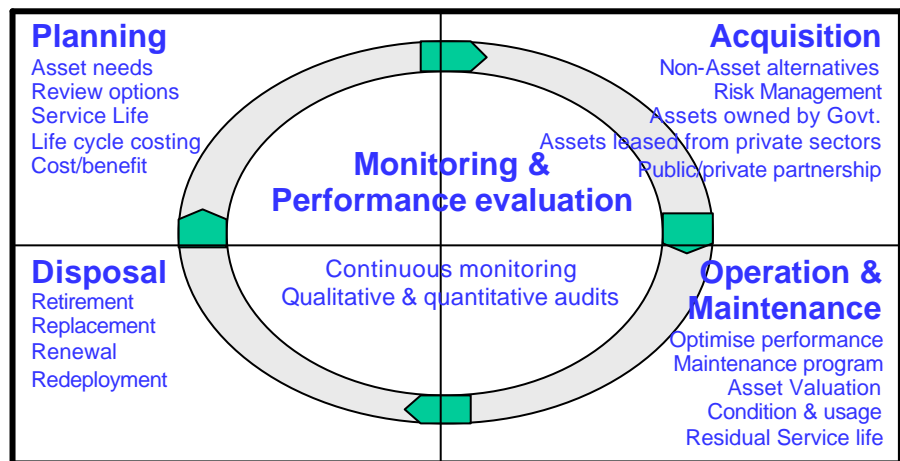


Fig 1: Asset Life Cycle (ANAO 1996; DTF Government of Victoria 2000)

The schematic diagram of typical asset life for BAM observed from Australian practices is shown in Figure 1. Table 1 shows a comparison of BAM policy and guidance material in Australia. There is considerable systems development activity using advanced technology in different States and at different stages. These include the use of GIS, Internet technology, relational databases and other software tools.

Table 1:
Comparison of Australian policy and guidance material in Building Asset Management

Organisation	Current Practices	Models and tools
Queensland (2002) Department of Public Works	<ul style="list-style-type: none"> • Strategic Asset Management Guidelines • AMS: QBIS (Queensland Building Information System) <ul style="list-style-type: none"> ○ On-line data collection and query assistance ○ Capability to analyse all asset data, from lot plans to maintenance, from a reliable and current source of information 	<ul style="list-style-type: none"> • Risk management, Value management, Life cycle planning, Management of projects • Asset Management Policies and Support tools <ul style="list-style-type: none"> ○ Capital works management framework tools ○ Maintenance management framework tools ○ Use of Internet technology ○ Post occupancy evaluation, Condition assessment, Functionality assessment ○ Ecological Sustainable Development

Queensland (2002)	<ul style="list-style-type: none"> • Government Asset Management System (GAMS) (a web-based knowledge management system with references to legislation, policies, better practice guidelines & information systems) 	<ul style="list-style-type: none"> • Database of Asset Information • Online community involvement • Use of Internet technology
Victoria (1996)	<ul style="list-style-type: none"> • Asset Management series and guidelines • Assessing condition of constructed assets 	<ul style="list-style-type: none"> • Guidelines and tools to aid Asset Management Series with examples
NSW (2002) Dept of Public Works & Services	<ul style="list-style-type: none"> • Asset.gov (online tools for management of Government assets "from cradle to grave," including support for planning, project delivery maintenance and disposal) 	<ul style="list-style-type: none"> • Online data monitoring • Life cycle assessment tool (LcAid – Life cycle Design Aid) • Use of Internet Technology
NSW Government Asset Management Committee (2000)	<ul style="list-style-type: none"> • Total Asset Management (TAM) <ul style="list-style-type: none"> ○ The asset strategy plan ○ The capital investment asset strategy plan ○ The asset maintenance strategy plan ○ The asset disposal strategy plan 	<ul style="list-style-type: none"> • Sustainable Development, Heritage Assets, Demand Management • Life-Cycle Costing, Economic Appraisal • Performance Evaluation, Post Implementation Review • Asset Information, Private Sector Participation • Value Management, Risk Management
South Australia (1999)	<ul style="list-style-type: none"> • Strategic Asset Management Framework (Asset Management Policy Series) 	<ul style="list-style-type: none"> • BLAMS (Building and Land Asset Management System)
Western Australia (1998)	<ul style="list-style-type: none"> • Asset Management Services 	<ul style="list-style-type: none"> • Building Condition Assessment Methodology • Western Property

The authors believe that the main areas needing improvement or further research in Australian context include:

- Service life planning for capital works and residual service life prediction for existing buildings to assist in optimising whole life cycle cost;
- Complete and integrated asset inventory systems using GIS, CADD (Computer Assisted Design and Drafting) and database technologies for management of data and its analysis;
- Cyclic inspection and condition assessment methods emphasizing performance improvement rather than maintenance expenditure;
- Building asset performance monitoring incorporating financial, serviceability, environmental, safety and legal aspects;
- Qualitative and quantitative audits to support meaningful performance measures; and
- Implementation of CMMS (Computerized Maintenance Management System) to enhance overall management and decision-making.
- Improved collaboration and coordination among the various Australian Federal, State and Local Governments in the development of policies, guidelines and systems on what are essentially similar asset management concepts, principles and practices.

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