The International Journal of Construction Management (2006) 57 - 74

Post Occupancy Evaluation: Development of a Standardised Methodology for Australian Health Projects

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Abstract
Post Occupancy Evaluation (POE) is considered an important stage of the implementation loop for health projects in Australia, allowing for feedback of evaluation results and consequent lessons into the planning stages of future projects. Although the use of POE is on the increase, the lessons learnt are not always adequately communicated or used for the purposes intended. There are many reasons for this including the lack of a commonly agreed methodology for conducting evaluations within and between different health jurisdictions in Australia. The results of this lack of standardisation include inconsistencies in data collection (type and format), in the analysis of the collected data and in the reporting of conclusions in a format useful for feeding back into the planning process.

The research project described in this paper involved a review of current POE processes used in Australia together with examples from overseas. The reasons for conducting POEs were identified and a manual titled 'The New South Wales Standard POE Methodology' was developed for a range of project sizes, types and locations. The resulting methodology was issued in draft form for testing on New South Wales (NSW) Health projects that occurred in late 2004. This testing was conducted by a major industry organisation who recommended that, subject to further clarification of assessment criteria and fine tuning of the methodology, NSW Health should adopt the methodology as a standard for use on all its capital projects.

Ultimately the intention is to share this methodology with the rest of Australia and New Zealand, and in the first instance, to agree to the use of an Australasian Post Occupancy Evaluation Methodology for evaluation of all health capital projects across that region. There is no logical reason why the methodology cannot be used in other countries in addition to that for which it was initially developed.

Key Words
Post Occupancy Evaluation, building evaluation, healthcare facility evaluation, facility evaluation methodology, health capital project evaluation, post implementation review

INTRODUCTION

Background

Most commentators would appear to be in general agreement that Post Occupancy Evaluation (POE) should be an integral component of the building procurement process. (Marans, 1984; RIBA, 1991; Shepley, 1997; Duffy, 1998; 2001; MARU, 2001; Zimmerman and Martin, 2001; Preiser, 2002). There is logic to the argument that one purpose for the evaluation of buildings in-use must be the provision of essential feedback to inform future actions. However despite the often 'clear-cut'case in support of POE, many commentators are also in agreement that POE has, by-and-large, been neglected by industry in general and the design professions in particular. Cooper (2001), for example, is of the view that, in the UK, POE has suffered almost 40 years of continued neglect. In particular, the use of POE as a feedback loop to the design process has proved to particularly intractable. As Vischer (2001, p.27) comments "...in

spite of the logical imperative to link POE results to the front end of the design process, efforts to do so have had to struggle to survive." In the last decade, there has however been renewed interest in POE fuelled by the emergence of facilities management as a major discipline in the procurement and management of buildings (Preiser, 1995; Baird, 1996; Cooper, 2001; Stanley, 2001). The research described in this paper is indicative of this resurgence of interest in POE.

Definitions

There are a number of definitions of POE, all generally in accord with, and built round the central theme of the simple statement (Preiser *et al*., 1988) that "post-occupancy evaluation (POE) is the process of evaluating buildings in a systematic and rigorous manner after they have been built and occupied for some time" Vischer (2001, p.23) loosely defines POE as meaning "any and all activities that originate out of an interest in learning how a building performs once it is built, including if and how well it has met expectations".

The RIBA Research Steering Group (RIBA, 1991, p.191) defined POE as "a systematic study of building in use to provide architects with information about the performance of their designs and building owners and users with guidelines to achieve the best out of what they already have".

Preiser (1995, p.19; 1997) stressing another perspective i.e. that of the facility manager, defined POE as "a diagnostic tool and system which allows facility managers to identify and evaluate critical aspects of building performance systematically". Clearly a POE may be carried out by a range of different building industry professionals, or as quite often occurs by the client or building owner.

However, for the purpose of this study POE was defined as 'the systematic evaluation of health service buildings or facilities' assumed to occur some time after their occupation and usually after a defined period of use such as 12 months to 2 years'.

Principal Functions of POE in the Context of this Study

The principal functions of POE, in the context of this study, were to feed forward the learning of lessons obtained from the review of completed capital projects into a process that would ensure that best practices are applied in future capital projects. More specifically it tests generic and specific aspects of the planning and detailed design of health facility buildings.

As noted by Zimmerman and Martin (2001, p.169) "The over-arching benefits from conducting POEs is the provision of valuable information to support the goal of continuous improvement".

Reasons for Undertaking the Project

There are a number of reasons why this project was undertaken. As will be discussed the opportunity to assess building performance versus design expectations is rational particularly in terms of the scale of the ongoing budget for NSW Health capital projects. This was announced in the NSW State Budget on 24 May 2005 as AUD $649 million for financial year 2005/2006 (NSW Treasury, 2005a).

However a more mundane, but equally compelling reason is the fact that NSW Health is required by the NSW Government (through its Treasury Office) to follow a standardised

methodology for procuring its capital projects. A key feature is the need to demonstrate a commitment to continuous quality improvement of both the project procurement process and its outputs.

NSW Treasury Mandatory Requirements

The NSW Treasury standard procurement methodology has been developed over a period of time, and was recently summarised in a process released in late 2004 as a 10-Step Procurement Process (NSW Treasury, 2004a).

The final step of this process, 'Step 10 - Evaluation', is the primary focus of the research project described in this paper (See Table 1: Step 10 Evaluation).

Of specific interest is the requirement that NSW Health undertakes a process of Post Implementation Review (PIR) that: 'collects and utilises knowledge learned throughout a project to optimise the delivery and outputs of future projects' (NSW Treasury, 2004b). This is a mandatory requirement which is reinforced by NSW Health's own policy directive PD2005_373 (NSW Treasury, 2005b).

Post Implementation Reviews

NSW Treasury gives guidance on PIRs through its Total Asset Management Services (TAMS) Manual (NSW Treasury, 2004b).

The TAMS guidelines to PIR set out a range of reasons for evaluating projects (the majority of these are clearly applicable to health projects). Benefits of undertaking a PIR are summarised as follows:

"Post-Implementation Reviews are the last step in the project delivery process and represent closure of the feedback loop. PIR means the lessons learnt from previous projects are fed-back into the process, to benefit future projects. ...Undertaking a PIR can generate both short and long term gains." (NSW Treasury, 2004b, p.5)

It goes on to identify a list of both short and long term gains. Review of the listed benefits suggests that the focus of the PIR is not solely on the production of a 'better' building. Indeed, the purpose for improving project outcomes is linked to better service delivery in the future by the agency undertaking the building or other project. This particular benefit is a key driver for the set of principles underpinning the development of standardised Post Occupancy Development methodology for NSW Health described in this paper.

Table 1 Step 10 Evaluation

	Purpose	Typical Deliverables	Outcomes
10. Evaluation	Review the outcomes of the project, ensure any learning is disseminated to stakeholders and determine future actions.	Contract evaluation report. Ideas and proposals to improve future procurements. Post Completion and/or Post Implementation Review. Benefits Realisation Report.	Comparison of the service outcomes achieved as opposed to the outcomes sought. Learning to support future actions.

Source: NSW Treasury (2004a) "10 Steps to Procurement Process - Construction". Available at: <http://www.treasury.nsw.gov.au/procurement/10-step-const.htm>, [Accessed on 2005 13 July]

LITERATURE REVIEW

The literature reviewed includes sources from the USA, Canada, UK, New Zealand and Australia. The results of the review are summarised below. Almost all sources quoted studied POE in terms of a range of largely similar issues that included the main purpose of POE, the reasons why more are not carried out, the main types undertaken plus suggestions were often supplied for useful techniques for actually undertaking them.

Purposes of Evaluations:
The first issue addressed in most of the literature is why POE should be undertaken at all and this is discussed in terms of its potential contribution to the building procurement process. Like most of the other sources, Jacqueline Vischer in her article 'Post-Occupancy Evaluation: A Multifaceted Tool for Building Improvement', Vischer (2001, p.23) notes that POE may be conducted for a range of purposes and reasons.

She considers the main reasons for conducting them that include initiation as "research (Marans and Sprecklemayer, 1981), as case studies of specific situations, (Brill *et al*., 1985) and to meet an institutional need for useful feedback on building and building-related activities (Farbstein and Kantrowitz, 1989). For some public agencies ... POE is a mechanism for linking feedback on newly built buildings with pre-design decision-making; the goal is to make improvements in public building design, construction, and delivery."

Preiser (1995, p.19) links conduct of POE to facility management. He also notes that the "tool is particularly beneficial to organizations with recurring construction programmes, or with a significant volume of facilities which requires remodelling".

In his introduction to his book 'Building Evaluation Techniques', George Baird (Baird *et al*., 1996, p. xxi) notes the benefits of evaluations, which suggest a range of purposes for carrying out a POE. "These include:

- Better matching of demand and supply
- Improved productivity within the workplace
- Minimization of occupancy costs
- Increased user satisfaction
- Certainty of management and design decision making
- Higher returns on investment in buildings and people."

Craig Zimring expounds the link between POE and organisational learning. He declares that the focus of his essay is on "the use of POE for improving organizational learning'. Zimring (2001, p.45) and discusses the work of Argyris (1996) noting that 'Learning is 'organizational' if it is about the core mission of the organization and is infused through the organization rather than residing in a few individuals". His paper discusses POE in terms of dissemination of 'lessons learned' and how this can help for example, a Federal building delivery organisation improve its performance through changes in its practices associated with procuring buildings. The NSW Treasury Post Implementation Review Manual (NSW Treasury, 2004b, p.3) discusses the range of purposes for evaluation by noting that "a number of strands of PCR exist including:

- Economic Review
- Brief Compliance Review
- Procurement Process Review
- Performance Review
- Technical Review"

Reasons why more evaluations are not carried out:
Jacqueline Vischer (2001, p.23) identifies the barriers to POE being "a more universal activity." She identifies these "barriers to widespread adoption of POE (as) cost, defending professional territory, time, and skills." She then looks at each of these in more detail.

Zimring (2001) discusses the incentives and disincentives that affect the number and range of POE conducted. In terms of disincentives he notes the consequences that may accrue in response to negative evaluation and that "whereas most organizations espouse innovation and learning, they behave in ways that limit it" (Zimring, 2001, p.47). He also notes that "The simplest barrier to using POE for organizational learning is when POE results are not available to decision-makers. Many organizations produce POEs as case study reports that are not widely distributed" (Zimring, 2001, p.48).

Zimmerman and Martin (2001, p.171) note amongst other points "Standard practice in the facility delivery process does not recognize the concept of continual improvement, or indeed, any ongoing involvement on the part of the designers ... the industry does not have an overall research and development focus, as evidenced by the lack of investment in R & D".

The NSW Treasury Post Implementation Review Manual (2004b, p.4) notes that "there are a number of reasons why post implementation review is not pursed more effectively.

- At the end of each phase of a project the assembled team disbands and moves quickly onto the next project.
- Long project timeframes. Some asset based projects can have extensive timeframes between feasibility and occupation (up to 3-5 years).
- Due to the long turnover period many of the factors that produced the original asset solution change. These factors include service delivery requirements, political factors, budget, state of the economy, industry practices, etc.
- Where projects exhibit shortcomings there is a perceived unwillingness to expose participants to perceived 'criticism'.
- In an increasingly litigious society criticisms may be taken as libellous.
- There are rarely funds for effective and continuous PIRS.
- PIR itself is often seen as ineffective. Overly complex and long-winded studies are perceived as time wasting.
- The asset management industry has not developed a culture of critical examination and evaluation.
- There is no effective mechanism for developing a "collective" reference system. Compare for example the legal and medical professions with their extensive case histories."

Ian Cooper (2001) notes at a more pragmatic level that in the UK the conduct of POE is not considered part of an Architect's standard suite of services i.e. in terms of a service for which a client will pay fees. He notes that "Client organizations are unlikely to pay for POE unless the benefits of such evaluations are both evident and add substantial value. Professionals are unlikely to offer POE, as part of the standard services delivered during the procurement process, unless issues of liability can be satisfactorily resolved" (Cooper, 2001, p.159).

Types of Evaluations:
There are many approaches to POE described in the literature, and thus many variations on the possible types of evaluation that may be carried out under the banner of POE. The types are generally discussed in terms of the focus of the evaluation °V whether it is concerned with

broadly based issues (e.g. overall design quality or efficiency of the procurement process) or at the other end of the spectrum is targeted more specifically on a key or narrow interest (e.g. a single element such as floor finishes). The type of evaluation may also depend on who 'owns' the POE and its results, generally in terms of who commissions it and who may carry out the evaluation.

The types of POE that Preiser (1989) discusses in much of his work have been developed to useful in a range of applications ranging from the investigation of a specific building, through to use for evaluation of an overall program. The types of POE he outlines may be summarised as three main approaches:

- Indicative (wide ranging application);
- Investigative (more detailed approach);
- Diagnostic (extremely detailed and focussed study).

Other pioneers of POE or evaluation techniques include the Medical Architecture Research Unit (MARU) at London South Bank University that issued in 2001 a Primer titled 'Evaluation Studies' (MARU, 2001). This primer notes that "Evaluation studies have a mandatory place in the Capital Investment Manual (CIM) with a requirement for a post project evaluation (PPE) plan to be included in the full business case submission." (NHS Executive, 1994; MARU, 2001, p.1). The MARU document discusses approaches to evaluation, at what project stages evaluation should occur, what can be evaluated and how an evaluation study may be devised. The guide outlines the study process in terms of the purpose of the evaluation (setting up the study), which questions need to be answered, what information will be required, how the study will be managed by the client, the feasibility, cost and timing and poses as the last consideration "is it worth doing?". This is a highly structured process applicable to a range of evaluation types from the broad scale to the specific.

The UK based PROBE project (Derbyshire, 2001) was a project that systematically carried out evaluations of a range of public buildings in terms of carefully developed and documented criteria in the area of building performance and user satisfaction. It then analysed the results and published them in technical journals. Due to limited resources, the initial studies did not address space utilisation, costs-in-use or aesthetics although it noted that parameters for assessment of these issues could be developed and implemented in a future evaluation project. The purposes for undertaking evaluation described in the NSW Treasury PIR guideline (NSW Treasury, 2004b, p.6) are discussed in terms of the review strands manifesting in PIR and PCR processes and the identified subgroups of these. The guideline notes the distinction between the two main strands as follows:

"PIR is a comprehensive feedback mechanism designed to assess project outcomes. This assessment focuses on how well the project outcomes were matched to the actual needs that the project aimed to fulfil.

This evaluation will indicate how well the agency communicated (through the project brief) the project outcomes and how well these were achieved. .....

A Post Completion Review (PCR) is intended to systematically and rigorously compare the actual performance of the project outcome with the stated objectives of the original brief. The PCR process seeks to identify ways in which future project conception, design development and implementation can be improved."

In her work, Jacqueline Vischer notes that "The importance of the *process* used in carrying out a POE cannot be underestimated; ... it is more important than the method selected and the data gathered" (Vischer, 2001, p.25) .

She identifies four types of POE and illustrates each with a case study. These are (Vischer, 2001, p.32):

"1. building-behavior research, or the accumulation of knowledge;
2. information for pre-design programming for buildings for which design guides or prototypes may be useful;
3. strategic space planning - i.e. building assessment as part of 'workspace change to bring space use more in lien with strategic business goals'; and
4. capital asset management - POE as a tool in developing performance measures for built space".

Practical Techniques for Undertaking POE:
Vischer's (2001, p.33) principles for conducting POE begin with the recommendation that the steps include: "1. A simple, reliable and standardized way should be developed of collecting useful feedback from occupants...on a few, carefully selected and identified indicators of environmental quality".

She discusses her conclusions regarding the best practices observed in her case studies and the particular advantages of linking POE with pre-design programming for public agencies or other organisations that repeatedly construct the same building type. She notes however that even in this situation it is not easy to implement, and recommends that an approach be designed ahead of time, process be developed and tested beforehand, and that adequate resources need to continue to be available for the process to be used most effectively.

She discusses 11 steps that should be incorporated into a workable POE process (refer to Vischer, 2001, p.33). In summary, these include recommendations regarding standardisation of data collection and reporting, advance determination of to whom POE results will be disseminated, the need for objective collection of data as well as by questioning of users and the appropriate management of user expectations.

In Baird (1996) the contributors offer detailed examples of various POE techniques from a range of perspectives that may apply to different project types and evaluation purposes. All the techniques described are carefully structured and generally hierarchical in their application to the process of gathering and analysing POE data from building clients and users.

More recently in the UK the AEDET process (2006) has been developed to help evaluate and choose between design proposals for Private Finance Initiative (PFI) health projects. The techniques embodied in this process are similar to those proposed for the POE types and approaches as discussed above (although the end purpose of the process is ostensibly to assess the quality of design proposals).

In addition to the literature quoted, the NSW DS24 Guideline for POE, dated Nov 1991 offers a rudimentary process for conduct of a POE including sets of questions to be asked and advice about reporting the results in a required format (NSW Health, 1991).

NSW Department of Commerce (formerly the Department of Public Works and Services) Total Asset Management (TAM) Manual sets out a process to be followed in the evaluation of new capital projects. This is part of the 10-step Procurement Process for NSW Health projects (NSW Treasury, 2005b).

Summary and Conclusions re the Literature:

There are a series of common themes raised in discussion of the history of POE and its current applications. These include the purposes for doing it, and the reasons for it not being done as often and as effectively as anticipated. A range of techniques is also discussed. In summary, the most salient points established include:

- Purposes for POE have been extensively teased out and well documented °V these are many and varied depending on the needs of the client, and the project being evaluated.
- There are a number of reasons why more POEs are not carried out, including not being part of standard design services or adequately funded by clients.
- The development of a generic or standardised building evaluation methodology, while neither new nor novel is a useful approach to undertaking evaluations aimed at improving the standard of the built environment.
- The use of POE by public agencies or large organisations that develop many buildings of the same type may inform the development and testing of prototypes (or design guides) that can result in time and cost savings (Vischer, 2001).
- A range of techniques has been extensively explored; there exist many useful POE techniques for a variety of purposes (Baird, 1996).
- Generally the processes used should contain a mix of quantitative and qualitative data collection and analysis. The mix depends on the nature of the evaluation and its major concerns.
- It is imperative to determine in advance to what use the POE will be put - this will guide much of the methodologies for data collection, analysis and dissemination of results.
- In undertaking a POE, it should not be necessary to test everything, rather it is more important to look at issues that make a difference and review those as a first priority.
- The feedback from facility users should be analysed to determine where to concentrate effort in analysing the performance of the facility.
- A broader use for POE may be to improve organisational efficiency or operations including facility management performance.
- The necessary organisational precursors for effective use of POE results may be interpreted in terms of assisting the development of a ‘learning organization’ (Zimring, 1989; Senge, 1994).
- In general, the practice of POE will form part of the process for continuous quality improvement, adopted by an organisation to guide delivery of its key business objectives.

This review of the literature suggests that the main focus of POE is not solely on the production of a ‘better’ building, but rather also on the realisation that a better building may also better support improved service (or business) delivery outcomes for the service agency or client funding the project. This has thus been taken as the starting point for the development of a standardised Post Occupancy Development methodology for NSW Health, as described in the next section of this paper.

RESEARCH PROJECT

Initiation

In late 2002, the University of New South Wales was invited to work with NSW Health on developing a generic POE methodology that would update the current methodology including the NSW Health Design Guideline (DS24) that set out a procedure for conducting a Post Occupancy Evaluation. At the time, NSW Health was embarking on the update of all its health facility design guidelines and so was concerned to ensure that a process was in place for the collection of more consistent data from the evaluation of its projects in order to produce meaningful results for use in the design of all its projects and in particular to inform the nascent Health Facility Guideline development program.

Following agreement that a standardised methodology for POE would be developed under the guidance of UNSW, project initiation took the form of a workshop that was hosted by NSW Health and attended by a representative cross-section of industry professionals and NSW Health staff. At this workshop, a range of different purposes and functions for POE were explored from both the literature and from the experience and opinions of those attending, and the results summarised in an outcomes paper that proposed a strategy for moving forward in the development of a generic POE methodology for healthcare facility projects. The decision was made to develop a methodology that could be used for a range of purposes that whilst including review of building projects could also be used to review the implementation of a new service delivery strategy or other forms of non-asset related projects.

Both prior to the workshop and subsequently, the literature search undertaken was essentially a review of existing project evaluation methodologies including examination of the types and purposes for POE, and the range of reasons behind the indisputable fact that many previous POE results were not disseminated or used as widely as anticipated by those who either paid for or conducted them. The application of POE to different types of projects to examine a range of issues with varying scale and scope was also reviewed from the perspective of NSW Health project experience and from a wider industry perspective. Conclusions were then drawn regarding the need to standardise processes for data collection, analysis and reporting that would include a mix of quantitative and qualitative data collection and analysis.

The summary of this research added weight to the decision to develop the standardised methodology and confirmed its initial focus on a process that would develop the 'evidence base' for the NSW HFG, thus forming a feedback loop for project learning to be fed from previous projects into the current and upcoming phases of NSW Health project development work.[i]

Development

Phase 1:

Development of the POE guideline was overseen by a NSW Health constituted Project Planning Committee (PPC) that was also overseeing the NSW Health Facility Guidelines development project at the same time. Membership of the PPC included NSW Health offices from both the Capital and Asset Management Services Branch, from the Statewide Services Development Branch, a NSW Health OH&S Officer, an OH&S Co-ordinator from the NSW Nurses Association, representatives from the UNSW project team and other consultant advisors from time to time.

Constitution of this type of committee as an expert reference group is a path commonly followed by NSW Health. The constitution, membership and terms of reference for the committee reflect the ongoing commitment to a wider ownership of processes plus the use of a wide range of expert user input that NSW Health espouses as part of its organisational culture and business practices.

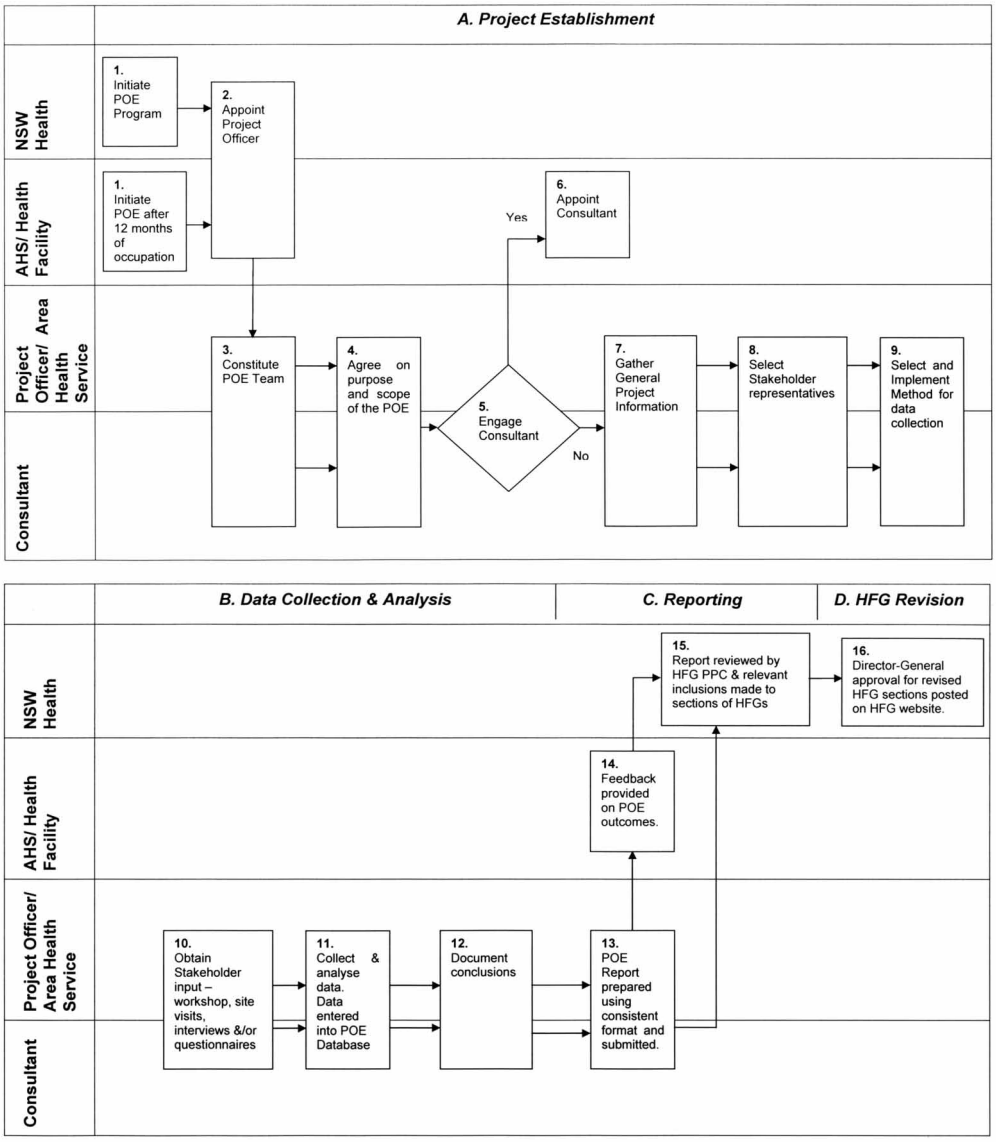
This is an understandable stance particularly as it accords with the observations made by Preiser (1995, p.21) that "no one person or group seems to be in control of the building delivery process any more. Rather major building decisions are made by committees, and an increasing number of technical code and regulatory requirements are placed on facilities, such as handicapped accessibility, energy conservation, hazardous waste disposal, fire safety, occupational health and safety requirements, and so on ... all these have to be complied with and brought into some balance ... building performance criteria are an expression and translation of client goals and objectives, functions and activities, and environmental conditions that are required".

Given the commitment of NSW Health towards the utilisation of industry skills and experience in the development of its facility procurement business practices and processes, it was decided to develop the first version of the methodology as a private consultancy commission to be undertaken by a local firm of project managers. This firm was selected as the result of a competitive tender and on the basis of demonstrated skills in the area of POE.

The project managers were required to work with UNSW and the PPC in reviewing the current POE literature particularly in terms of relevant POE methodologies. Drawing on the conclusions from this and their own industry experience, they were then required to develop a standardised POE methodology and its component parts. This required consideration of how to tailor data collection, how to store it and how to analyse it for different types of POE. It then required development of a process for compiling and documenting the conclusions drawn and the translation of these into recommendations for future projects (including incorporation into the NSW HFG development and review processes). It also included development of a consistent reporting format that would allow comparison between projects to be made, and the potential for conclusions to be drawn at a more strategic level in terms of the overall quality of NSW Health projects being undertaken perhaps of a particular type, over a particular time frame or in terms of other parameters of this kind. They were to make recommendations regarding, and provide samples of the materials to be used at each POE stage to achieve the use of the standardised methodology for PPC review and ultimately for testing in practice.

In addition, the 'business' processes followed by NSW Health in conducting a POE, that included such issues as deciding whether and how to employ a consultant, including contract issues for tendering and engagement of consultants, the briefing of facility representatives and user groups for successful project participation, etc, were also to be identified and documented. A flow chart illustrating the business process of conducting a POE and a range of materials was to be produced that would subsequently be included as an appendix to the methodology in order to facilitate its use in practice. (Figure 2)

The balance of quantitative versus qualitative assessment was discussed in terms of the aims and objectives of the POE program and its initial purpose for development of an 'evidence base' for the NSW HFG and projects briefed in accordance with these. It was determined that one of the key purposes of the methodology was to allow comparison between projects, and to



Note: *AHS = Area Health Service*
HFG = Health Facilityh Guidelines
PPC = Project Planning Committee

Figure 2 Process for Conduct of NSW Health POE (from NSW Health Standard POE Methodology, issued May 2004)

this end a transparent method of scoring project outcomes was determined as a desirable project output. To achieve this, the consultant was required to investigate appropriate scoring methodologies for both quantitative and qualitative assessment issues and to make recommendations regarding the weighting of these (on an issue by issue basis) so as to produce meaningful and useful data analysis and evaluation conclusions.

The first phase of the project (i.e. the consultancy) was completed and the PPC reviewed the project outcomes. It was decided that whilst a reasonable first draft was achieved, not all the objectives were achieved and so it was decided that UNSW should continue revision and completion of a second draft that would become a useable document for testing by industry.

The output from the first phase of the project (the consultancy) produced material that largely complied with the requirement to document the POE business process issues but failed to adequately grapple with the fundamental issues associated with development of a standardised methodology for conduct of POE on a facility building project i.e. the reasons for doing the POE, the collection of data and its analysis plus the ultimate use of the conclusions and recommendations. This was not the fault of the consultant, rather the result of a lack of clarity expressed by the PPC around the purpose and goals of the whole project. In retrospect it appears that these tended to gravitate towards business process issues, perhaps because these were easier to understand, and away from grappling with more fundamental POE methodology issues relating to the techniques required to carry out a POE in practice.

Phase 2:
In the second phase of the project, UNSW revised and edited the components relating to business process issues and further developed and documented the processes surrounding the actual conduct of a POE for a facility. This included development of a framework for use in determining the kind of POE being undertaken (the POE matrix discussed later in this paper) preliminary data input templates for sets of questions, both quantitative and qualitative, and an outline of a proposal for a database for storing and retrieval of POE results. An outline reporting format was also developed to compile the results and assist in developing a consistent format for recommendations emanating from conduct of the POE.

In both stages of the development process the PPC acted as both the key stakeholders and as a reference group. The project was completed over a 12-month period, the first draft in about 8 months and the second over the next 4 months. Following completion of the second draft, it was provided to two industry reviewers for informal review. Both these consultants had completed many POE for NSW Health and other health clients; they recommended that the methodology was ready to be 'road-tested' in the evaluation of real projects prior to its finalisation and release for wider industry use.

Phase 3:
The second draft was also reviewed extensively with officers of NSW Health Asset Management Services Branch before testing on real life POE projects was undertaken by another industry consultant. This industry review process tested the methodology on four types of Health Planning Unit (HPU); these were emergency units, maternity units, paediatric units and medical imaging units. The industry review consisted of conducting POE on these units, using the processes outlined and questions generated from the examples given in the draft methodology.

The exemplar questions given in the draft methodology were based on clauses in the NSW Health Facility Guidelines that were being developed simultaneously. The lists of questions were never intended to be prescriptive, rather to indicate how sets of questions should be structured to provide feedback useful in guideline development. They fell into two main categories - questions that gathered quantitative information and questions that gathered qualitative information and assessments. Reporting templates were then given for reporting data analysis for each category of information.

An overall POE Report template was provided for each POE conducted that would summarise information about the project, the process undertaken for the study and the conclusions resulting from the analysis of the data.

The review of the draft methodology by the industry consultant made a range of recommendations that will be incorporated into future development of the methodology. These included:

- Consideration should be given to conducting POE at 2 to 4 years post occupation rather than at the 12-month point prescribed by the methodology and by the NSW Health Process of Facility Planning. This accords with the time frame suggested by the NSW Treasury PIR guidelines which suggested that they be conducted 2 to 5 years post completion (NSW Treasury, 2004b).
- Information collection processes should be further developed to reflect different project types and programs e.g. ranging from evaluation of a suite of like facilities at different sites through to a single facility review.
- The question templates should be similarly further developed including:
  - Expanding explanations of the difference between, and the intent of, quantitative and qualitative data collection.
  - Development of the generic questionnaires to reflect all components of the NSW Health Facility Guidelines, with guides as to the use of each segment and appropriate respondents for each.
- The process should stress the appropriate briefing of questionnaire respondents so that they understand exactly what is expected of them.
- The nominal scoring systems should be further developed and consideration given to reducing the range of scores available from 10 points to 5 points.
- That as noted in the methodology, those using the tool should ensure that all documentation required for a POE is available prior to commencement of the study.
- That the methodology be refined and further tested before issue as a final POE guideline by NSW Health.

Description of the developed POE methodology

The following section of this paper draws from the written advice given to POE users contained in the draft document i.e. the draft Standardised POE Methodology for NSW Health.

Scope

The draft document begins by noting that the process for undertaking a post occupancy evaluation is similar for all types and sizes of capital projects. The need to investigate specific, unusual or more detailed issues may require some modification to the POE methodology. The purpose of a particular evaluation will determine the nature of the data gathered, observation undertaken and questions asked. The emphasis to be given when analysing the data and the reporting of the conclusions and recommendations generated by the study will also be affected by the purpose of the POE.

The POE Matrix (Figure 1) was developed to illustrate that a POE may be used for a range of clearly defined purposes. This includes the refinement of technical processes and standards, testing of service planning assumptions plus the testing and evaluation of investment decisions and business cases for implemented projects. The purpose and objectives of each type of POE will determine the format and range of the data to be collected.

Figure 1 Issues Tested by NSW POE Methodology

	Service Outcomes	**Facility Functionality**	**Facility Procurement Process**
Project Profile *Generic project information (minimum data set) collected to enable comparison of projects.*	Data collected includes: Role delineation, catchment size, Service level, occasions of service, operational budget, staffing FTE, project services, catchment area, bed numbers etc.	Data collected includes: Building HPU, HPU cost, HPU Gross Floor Area, HPU Circulation Area, HPU Travel and Engineering.	Data collected includes: Capital budget, program, procurement methods, PFP approval, PDP approval, predicted project length.
Facilities Data *For overall facility issues*	*Data collected to test:* *- Improved health outcomes as per government strategies and Procurement Feasibility Plan eg Facilities supporting desired service models*	Data collected to test the generic section of the HFGs e.g.: Performance against the Project Definition Plan, Design, Building Services and ESD, OH & S, Safety and Security, Infection Control Particular HFG requirement e.g. ensuite sizes.	*Data collected to test:* *- Effectiveness of PDP process in achieving the built project.* *- Scope and budget control* *- User group process* *- Communication strategy* *- Project management processes*
HPU Specific Data *For specific HPU*	*Data collected to test:* *- Estimated service utilisation (PFP) for Health Planning Unit vs actual.*	Data collected to test HPU specific sections of the HFG: Test performance against the Project Definition Plan. - Test HFG requirements - Design and technical issues feedback to HFG and TS11.	*Data collected to test:* *- Test operational commissioning process and feedback to POFP review*

Source: University of New South Wales and NSW Health (2004) "NSW Health Facility Guidelines: Post Occupancy Evaluation Guideline", Unpublished work, pp.7.

KEY:

Data collection templates developed

Data collection would come from an extension of the project profile information to test specific issue

The methodology as developed is a standard process that will apply to most evaluations, of completed capital projects. In particular, the front-end section that gathers general project data may also be used for other types of evaluations.

Data Collection and Analysis

Once the purpose of an evaluation has been determined, relevant project information should be gathered - this will include the size, cost, procurement method, available documentation, program and other project history.

The next step is the collection of detailed feedback from those who use the building or facility on a daily or regular basis. Both quantitative and qualitative information are collected and the responses received recorded in a consistent format (templates are provided for this purpose), having generally been assessed in terms of agreed assessment criteria or scores.

At this point, those conducting the study must use professional judgement and discretion when recording, analysing and assessing the information (and opinions) received. In most cases, the differing perspectives of those providing the data must be acknowledged.

Intended Outcomes including Improving Future Capital Projects
Conclusions are then drawn in terms of how well the facility or building matches the criteria established for the POE. Ways to improve building design, performance and fitness for purpose are identified, documented and ultimately fed into relevant Guidelines and policy documents e.g. Health Facility Guidelines, NSW Heath Process of Facility Planning. Ultimately this process is intended to improve the delivery and performance of future health facility capital projects. See Figure 2.

Issues Tested by the NSW Standard POE Methodology
The issues tested by the methodology are described by the POE matrix (Figure 1). The colour coding of the diagram illustrates that the issues specifically addressed are those in the top 3 fields and those in the middle column of fields - forming a 'T' pattern within the matrix. The methodology as developed applies largely to the assessment of facility functionality and can be applied at the different levels of complexity of data collection.

The matrix illustrates that a POE may collect data in three main categories - service outcomes (or business performance), facility functionality (fitness for purpose, physical quality, compliance with technical standards) and procurement processes (time, cost, probity compliance, etc). The data may then be collected for one or more categories at three defined levels of complexity i.e. project profile (minimum data set for all capital projects), facilities level data (standard requirements for all projects including general HFG requirements, overall facility performance, etc.) and specific data (for a particular part of a facility such as an operating unit or for a specific small scale element that occurs across many, if not all health facilities e.g. bathroom design or finishes).

This is a similar approach to POE structuring in accordance with those developed by others as referenced in discussion of the literature. For example, the MARU process (MARU, 2001) identifies a similar range of issues for evaluation grouping them slightly differently and at a greater level of detail. Preiser's (1995; Preiser and Ostroff, 2001) three types of POE (indicative, investigative and diagnostic) also largely correspond to the issues addressed in terms of complexity of data collection in the NSW Health methodology. The NSW Health methodology matrix combines elements of both these (and other) approaches to POE into categorisation of nine different types of POE. In practice, it may be surmised that clearly these may not be as clear cut as presented; yet the matrix also merits consideration as a potentially new framework for definition of the purpose and context for conducting a POE.

While the types of studies to which this methodology applies are described by colour coding of the matrix, the issues that it does not specifically address are also illustrated in the same way by means of a contrasting colour.

Other components of the draft methodology document
The remainder of the NSW draft POE methodology document (see Figure 2) sets out the 'business;' related processes to be followed in determining the need for a POE, how to engage a consultant or undertake it 'in-house', how the results should be analysed and sets out a reporting template for all POE undertaken. This template is intended to ensure that NSW

Health receives the data and conclusions drawn in a consistent and comparable format for all POE. One of the issues in the past has been varying formats, levels of detail and types of analysis undertaken.

Interface with Other Government Guidelines and Standards

Within the framework required by the NSW Treasury, the methodology sits beside and informs other components of the NSW Asset Management framework. There is further potential for it to be used to collect data for the NSW Health Asset Register, to be used to test and refine the NSW Process of Facility Planning and to develop benchmarks for use in briefing healthcare facility projects. It must also be considered as part of the Total Asset Management process required by the NSW Government for all its projects. As such it forms part of a continuous loop of quality improvement whereby continuing incremental improvements in quality improve both facility and project performance over time.

One of the key purposes behind the development of the NSW POE methodology was the intention of NSW Health to use it to inform the development of health facility guidelines (HFG). Over the last 3 years, NSW Health has invested substantially in the development and upgrade of its design guidelines for the briefing of its healthcare facilities culminating in the release of these in a web version and cross referencing in an interactive electronic briefing system. These standards and the POE methodology developed by this project will be made available at national level within Australia and to New Zealand to form a body of standards that will ultimately become the endorsed Australasian standards for health facility design and evaluation.

The development of health facility guidelines currently being undertaken for NSW, Victoria, Australia and New Zealand has assumed a process of continued review and updating. It is intended that post occupancy evaluation will continue to be one of the main sources of information for use in this ongoing process as a source of data for the ‘evidence base’ intended to support ongoing guideline use on health projects within Australasia.

CONCLUSION

The process of POE is particularly useful for helping to develop appropriate design standards for such a category of buildings that accommodates highly technical processes with many repetitive elements. Many healthcare facilities are built each year, often many of the same type are built, on every project achieving best value for the funds expended is always expected and due to the size of the market, refinement of the process over time is both possible, and probably inevitable. Although healthcare buildings are particularly appropriate for application of POE, other institutional type buildings e.g. schools, prisons, train stations, etc are also highly suitable for this approach.

As stated at the onset, the need to conduct POEs as a means of providing essential feedback to inform future actions would appear to be self-evident. The reasons why POEs still remain the exception rather than the rule have been reviewed and some of these have been considered and addressed in development of the POE methodology for NSW Health as described in this paper. Not all the reasons for under-use of POE have been addressed in this current study rather it is suggested that the remaining issues fall outside the scope of this research, perhaps requiring future investigation.

This paper has endeavoured to describe how a research project has assisted a large public agency in the health care sector to respond to the challenge of developing a standardised POE methodology which has the capacity to provide consistent 'evidence based' information which as a result of incorporation into design guidelines, should inform future health facility design decisions. The potential as well as the limitations of the methodology will require further exploration in use.

The point is made that although this methodology has been developed in response to a specific set of demands in the public health sector, there is no reason why the set of principles which have been developed cannot be employed in other sectors that interface with the built environment within Australia and other countries. The principles behind development of the methodology are sufficiently generic (as evidenced by the literature reviewed) that they could well be applied to a range of different project types and to different project procurement environments.

Following the testing, review and further development currently being undertaken, it has been agreed that the methodology will be shared and implemented within the rest of Australia and New Zealand. Ultimately, this will result in the use of an Australasian Standardised Post Occupancy Evaluation Methodology for evaluation of all health capital projects across that region. There is ultimately no reason why the methodology could not be used in other countries and health systems, as it is sufficiently flexible to allow its adaptation for use in other locations.

[1] *Discussion:*
NSW Health is an example of one of the organisations for which Preiser (1995, p.19) and others believe that POE is particularly beneficial because they have 'recurring construction programmes, or (with) a significant volume of facilities which requires remodelling'. In addition, the Health Facility Guidelines to be developed were intended as a specifically designated design guide supplying 'expert' information for the briefing process for NSW Health facility projects. Post occupancy evaluation was thus anticipated as a primary method for generation of 'evidence' or data for incorporation into the design guide to ensure that the design of future NSW Health projects was to be far more 'evidence-based' than currently appeared to be the case.

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