Post Occupancy Evaluation

An insight into current POE-related policies and practices by European public authorities to drive sustainable construction and innovation.

What is POE?

Current policies and practices

Key barriers to greater implementation

Conclusions & recommendations

v.1 June 2012
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What is the SCI-Network?

The SCI-Network is a network of European cities and other public authorities working together to find new, innovative and sustainable solutions for their public construction projects.

Together with other expert organisations, the participating public authorities hope to:

- Identify the most sustainable construction solutions for their needs available on the market in Europe
- Make sure their construction procurement practices and procedures are set up to best encourage new, innovative solutions

This report forms part of the first round of outputs from the Working Groups which have been established within the network. Further information on the Working Groups and their outputs, is available at:

www.sci-network.eu

For further information on the content of this report, or to submit your responses to the questions highlighted, please contact:

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Further discussion of this report and related topics will take place on the online Forum:
http://procurementforum.viadesk.com
**Introduction**

This report researched and produced by Constructing Excellence provides members of the Sustainable Construction & Innovation network with an insight into the awareness, policies and working practices by a range of European public authorities for Post Occupancy Evaluation (POE).

It follows a short period of direct and indirect engagement of European public authorities to begin to identify the extent to which POE is being used to promote sustainable and innovative construction practices and how POE is being used by public authorities to verify the performance of such sustainable and innovative products & services.

As such, the following is not an exhaustive or authoritative audit of current activity, but identifies some of the key issues, benefits, drivers and barriers; it also provides some brief examples of where authorities have developed and implemented effective POE policies. It is hoped that this strategic overview together with some practical examples will help those in the Sustainable Construction & Innovation network to develop and implement innovative and integrated procurement policies that demonstrably deliver economic, social and environmental benefits.

**Executive Summary**

Post Occupancy Evaluation is a structured review of the functional, operational and strategic performance of the building during occupation – the third part of Demming/Shewhart’s Plan Do Check Act project framework. It is the gathering and interpretation of both a building’s energy/technical data, space utilisation and occupier behaviour. This data is critical to ensure built assets to maximize occupier productivity with the minimum resource.

The majority of European public authorities appear to understand and accept that POE is critical – as higher occupier performance and lower environmental impact are much more likely in assets designed, constructed and operated with a clear understanding of current performance data for both.

Public authorities requiring and using POE consistently report significant benefits. In financial terms, they range from reduced in-use energy consumption (reduced costs & carbon emissions), reduced construction and maintenance costs, and improved occupier productivity.

Yet usage of POE appears extremely low. Key factors frequently cited include:

- Property can be seen as a low priority for an organization as only a fraction of expenditure – yet facilities have a huge impact on productivity and costs are sometimes second only to the workforce.
- Disconnect between those that procure, provide and use a building – so encourages localized cost-cutting despite consequence on others
- Time pressure on staff time and project programmes – no time to ‘plan’, just ‘do’
- No mandate or requirement from a senior person or organization – so it is treated an ‘optional extra’ rather than ‘critical input’.
- Disconnect between similar projects and organizations – preventing comparisons & shared learning
- Fear of being associated with a poor performing project – it is better not to ask than have to deny/distance themselves.

Clear strategic connection and executive responsibility across those that procure, operate and use facilities will deliver increased workforce productivity, lower operating costs and better return on investments.
What is POE?

Post Occupancy Evaluation is the regular collection and review of

- occupier satisfaction
- space utilization
- resource consumption

for the ‘normal use’ of completed constructed facility during occupation to identify key occupier and/or building performance issues.

It is the third part of Demming/Shewhart’s Plan Do Check Act project framework. In these terms, POE is used to assess how the built asset performs against defined ‘business’ needs of the organization using that asset. This ‘in-use’ intelligence is critical to drive better procurement, design, delivery and operation of the current facility and indeed others required within or outside the same organization.

A structured systematic POE process can answer several significant questions including: is the constructed facility and its occupiers operating as planned? If not, what corrective measures are necessary? And, how can buildings be better constructed in the future?

Key measurement tools/techniques include:

- Occupant survey questionnaires
- User Interviews and surveys
- Walk-through observations
- Metering & sub-metering
- Infra-red thermography
- Air permeability tests
- U-value testing
- Co-heating test
- Project completion reviews – often more ‘construction process’ than ‘in-use operation’
Evaluation comprises metrics, measurement and analysis – and should always be driven by the organisation's core business needs. The UK-based Usable Buildings Trust suggests at the basic level ('Need to know' not 'nice to have'), the standard BUS occupant survey has 20 core questions and 45 building performance questions. There are various governmental and commercial benchmarking systems available for energy/resource consumption, space utilisation and occupier satisfaction as a proxy for workforce productivity. Best practice recommends use of independent evaluators to improve objectivity.

Why is POE important?

In Europe, the built environment sector represents over 40% of all greenhouse gas emissions. According to the Intergovernmental Panel on Climate Change (IPCC), it is also in this sector that measures to reduce the emissions will have the greatest effect. Developing zero emission buildings – buildings with extremely low energy requirements and a zero net climate footprint – is therefore an extremely important climate measure which can contribute to solve many of the environmental challenges we are facing.

The built environment capital investment programmes across Europe are vast and ongoing; typically half of public capital investment is in new build assets, the remainder in refurbishment works. The current intense economic pressures are forcing all authorities to dramatically and immediately reduce costs whilst limiting any long term negative consequences of short term decisions.

Many public and private sector organizations are investing in highly sophisticated and complicated buildings in the belief they will perform better. Some do, though many appear to fall far short of expectations, stated requirements and even below traditional buildings. Evidence suggests occupiers can’t operate overly complicated building systems or their business needs change quicker than the design team anticipated.

POE is therefore critical to:
- Ensure the asset continue to maximize the occupier’s productivity and resource efficiency
- Inform better capital investment decisions for refurbishment works and new buildings – maximizing whole life value and carbon emissions reductions across the organization
- Ensure investment is defined by assessed user ‘needs’ rather than perceived ‘wants’
- Improve the predictable performance from design, construction and operation of innovative and sustainable built assets, particularly through shared lessons and data

All capital projects begin with strategic brief, progress through capital allocation to project delivery, and into operational use. Government agencies and public authorities have clear structured ‘gateways’ that a capital project must adequately complete before it can progress on to the next stage. Stages often require input from numerous internal and external stakeholders to ensure it meets their requirements. Capital project stakeholders will almost always include senior executives from the commissioning organization, external funders, statutory bodies (incl. regulators), design and construction companies, etc.

There is overwhelming belief, best practice guidance and countless policies across European public authorities that require the earliest possible involvement of all key parties. But surprisingly, this short study undertaken for the Sustainable Construction & Innovation Network suggests that the users/occupiers and the facilities managers are sometimes only involved in the capital project process when all core decisions have been made or perhaps even when the asset is actually complete. Not only does this prevent them from contributing useful ideas that often would reduce the project’s whole life costs and increase the whole life value, they will feel ‘isolated’ from the project or its purpose, and will not operate the asset in the way it was designed. Additionally, designers operating without relevant actual ‘in use’ performance data are forced to rely on unproven or inappropriate building technology models. Failure to engage users and poor ‘handovers’ to facilities managers are the two most significant factors causing buildings to perform on average 30% below expectations.
What does POE cost?

The cost of POE varies according to complexity & frequency of evaluation, whether monitoring & evaluating energy consumption, space utilization or occupier satisfaction, and to an extent the size of the facility involved. Some European public authorities (e.g. NHS Scotland) require up to 1% of the capital investment to be used for structured POE and sharing of lessons learnt.

Whilst not undertaking POE delivers ‘visible’ short term savings, the ‘invisible’ cost of not monitoring can be huge. Failure to collect and use POE data largely prevents an organization from making fully informed procurement decisions, risking inappropriate investment in a new facility when improving an existing one would deliver better results, or investing in complex technologies that do not deliver operational performance as expected/required.

Moreover, the cost of POE is almost insignificant when compared to the overall occupier’s business operations costs – occupier’s salaries etc. are typically 200 times the capital investment spread over 25 years – so it is critical the facilities maximize staff performance as well as minimize resource consumption. POE consistently costs considerably less than the savings and productivity gains it helps to deliver.

It is almost always the client organization that commissions and pays for occupancy evaluations, as they have the primary and ongoing commercial interest in optimised occupier & building (energy/technical) performance. However, a growing number of enlightened designers/constructors/suppliers see commercial value in independent in-use evaluations – as they can use lessons learnt to accelerate their internal continuous improvement programmes, and use evidence of high predictability of ‘in-use’ performance to differentiate themselves in competitive markets.
Current Policies

Most European public authorities engaged in this short study have policies that require at least a ‘capital project review’. But relatively few authorities appear to have policies focused on monitoring and comparing ‘in-use’ performance against design expectations/requirements, or policies connecting those responsible for capital projects with the departments using the facilities.

Policies identified in this study operate within the following general ‘building performance evaluation’ framework:

- Pre-project user surveys to identify actual organizational needs & engage key people
- Project reviews at 3-6 months typically to review construction project process and identify early issues
- Operational review at 12-18 months to assess how a building is performing against design standards and benchmarks
- Strategic review at 36-48 months to assess if organizational needs are still being met

However some leading European public authorities intentionally connect project justification (business case), briefing & design, implementation, initial in-use and normal in-use. For example NHS Scotland have very clear integrated procurement policies/guidelines – and systematically collect data and share best practice within and outside the organization to improve operational performance and the return on capital invested.

The UK-developed “Soft Landings” framework (www.SoftLandings.org.uk) is a cradle-to-occupation process for the graduated handover of a new or refurbished building and is being used by a number of public authorities. It requires the project team to plan and provide professional aftercare for up to three years post-completion. This is to ensure an effective transfer of ideas, best practice and operational knowledge transfer between the design/construction team and those operating & using the facility. Some are considering partial fee retention until this graduated handover is complete and the asset performs as required and promised.

The increasing use of Building Information Modelling (BIM) across Europe provides a powerful framework for integrating in-use evaluation into design, construction and operation. The UK Government is currently developing policies to integrate the Soft Landings framework into key BIM stages for all central government capital projects, as it believes this will further accelerate sustainable cost reductions and improved in-use operation and performance. Proven high predictability of ‘In Use’ performance is likely to become a key facet of this policy.

The Scottish Funding Council also produced good guidance in 2007 encouraging use of POE as a prerequisite to capital allocation funding bids. It asks all universities that receive capital funding allocation to submit a case study of the use of POE – none are yet available.

The Association of University Directors of Estates produced guidance in 2006 on how and when to use POE - http://www.aude.ac.uk/info-centre/goodpractice/AUDE_POE_guide - it includes a tools selection matrix for each key stage in a project - Operational Review, Project Review, and Strategic Review – and identifies both some of the tools to use and the issues to evaluate:
### Operational Review

<table>
<thead>
<tr>
<th>KEY</th>
<th>Qualitative assessment</th>
<th>Analytical assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most suitable approach</td>
<td>Observation</td>
<td>Interview</td>
</tr>
<tr>
<td>Quite useful</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Least useful</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not applicable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### PROCESS

- Brief development
- Procurement
- Design development
- Construction
- Commissioning
- Occupation

#### FUNCTIONAL PERFORMANCE

- Strategic value
- Aesthetics and image
- Space
- Comfort
- Amenity
- Serviceability
- Operational cost
- Life-cycle cost
- Operational management

#### TECHNICAL PERFORMANCE

- Physical systems
- Adaptability
- Environmental
- Durability
Working Practices

The Netherlands’ Rijksgebouwendienst applies POE to assess the technical quality of a building and in addition is starting to expand this to measure performance from a user perspective. The former (called the RgdBOEI) focuses on fire safety, maintenance, energy usage and conformity to building regulations; this is undertaken every five years during the life span of the building, is applied to all owned constructions including monuments and is being used by the ministry of infrastructure, some municipalities and some social housing companies. The expansion to measure performance from a user perspective will seek to benchmark buildings against each other and to match supply and demand more effectively. Building performance will be measured against a range of indicators including safety, use, flexibility, facilities and sustainability.

Somerset County Council used POE to cut their office space and associated costs by 46% through early occupier engagement and evidenced user needs. In May 2012, Somerset completed the pilot (proof of concept) phase of their Smart Office programme, rationalising offices from 32 to 5 main hubs supported by a number of drop-in bases. The pilot sites are expected to enable 50-70% less desk requirements (depending on team work styles), similar reductions in gross floor area and consequent huge savings in capital and operating costs. Somerset developed a “Staff Functionality Review” toolkit, which it used to evidence existing work patterns, occupancy and storage requirements, engage with staff and managers, and plan future requirements. The toolkit was made available to other users on the South West Councils Huddle site. Evaluation of a built asset is via a combination of Occupancy (Physical Surveys), Cost (Actual data), Condition (Survey), Suitability (Focus Groups), Value. POE will form part of the handover, but will continue to be evaluated at specified points.

In Finland, Senaatti has been undertaking POE for major projects for the last ten years. This takes the form of a qualitative POE survey undertaken at the building handover stage as well as annual customer/user surveys. In addition, quantitative surveys of both clients and property managers occur approximately 18-24 months after construction completion and covers the main POE issues.

Transport for London takes a systematic approach to measure energy consumption of each element in each building, allowing rapid identification and resolution of sub-target performance. The graphs below are taken from a recent Building Health Check report showing ½ hourly meter readings for electricity and water, within and outside the standard occupancy hours 7am-7pm. This prompted TfL to investigate high consumption outside these core hours, particularly high baseloads and if occupiers are leaving equipment & lighting on overnight whilst unused.
In Sweden, Stockholm County requires all projects over 3 million SEK (about 330,000 EUR) to evaluate the project process (planning, time, cost, collaboration etc.), the asset's in-use performance compared against the originally stated requirements, and the occupier's contentedness. At handover the project manager hands over all documentation to the Property Manager and the Operations Manager; information concerning constructions that may influence the energy consumption in one way or another are presented separately to the Operations Manager and the Energy Controller. The structured review occurs at 3 months after handover.

Some Austrian authorities use POE, though it is often done by individual departments and typically focuses on benchmarking energy consumption and costs against benchmark data rather than against designed performance.

In Germany, The Bundesanstalt für Immobilienaufgaben reports that does not use bespoke POE to evaluate the performance of its built asset. Instead some internal mechanisms provide information about "customer satisfaction" of BImA-services. Office space requirements are together identified by the state agencies and public administrations ("customer") ensuring a permanent feedback to BImA.

In Denmark, most organizations use quantitative questionnaires in order to get an insight in the functionality of the building. Some use also interviews with groups of users. The POE is most often carried out 3-6 months after moving into a new or refurbished building, but as a stand alone activity which is not standardized. The Danish Building and Property Agency itself recently moved to a refurbished building. After a period of 2-3 months it sent out a POE questionnaire. The results are currently being analyzed and they expect to set up a number of groups to discuss and find solutions to the main issues concerning noise etc.

NHS Scotland is amongst the best example identified of an integrated, systematic and collaborative approach, investing up to 1% of a project’s capital sum and reporting not just large cost savings but importantly better health recovery rates. It developed a fully integrated system that builds on the broader Scottish Government guidance and perhaps importantly is mandated. User needs and business outcomes are the golden thread that runs from capital investment bid through construction well into operation. Funding will not be provided without compelling evidence of user involvement. Each stage requires a summary report. A project review is completed within 1-3 months after handover and the lessons learnt are compiled and shared with others within the network. The full details on NHS Scotland’s mandatory arrangements for Project Evaluation are accessible at: http://www.scim.scot.nhs.uk/Manuals.htm; in addition the published annual reports on key lessons learned are accessible at: http://www.pfcu.scot.nhs.uk/news.html

Fife Council introduced POE to all new build schools since 2006; it is currently introducing POEs to major refurbishment or small extension projects. POEs are undertaken once the building has been operational for a minimum of 6 months but preferably after a year of occupation. They are currently in the format of a questionnaire to be completed by parents, teachers and upper school pupils. Questionnaire analysis is followed with an onsite walk through of the building with small groups of users usually within their user group ie (management team, teachers, pupils, parents local community users) to try to understand the reasoning behind the answers on the questionnaire and identify what works well and what does not for future projects. POEs take time and effort to undertake but the benefits over ride the resourcing issues as the POE process can highlight design issues with the building which can be addressed in future builds. However, whilst those involved have high expectation that issues highlighted will be addressed, often there is no funding remaining to rectify problems.

In Northern Ireland, Oaklee Housing (a Registered Social Landlord) undertakes a New tenant survey (for new build) that focuses mainly on user aspects of design, & tenant experience of pre-tenancy viewing, moving in, contact with HA staff & demonstrations. It also undertakes a 12-month post-project review that starts with review meeting with all internal stakeholders & concentrates on extent to which key Economic Appraisal objectives were achieved & lessons learned – quantitative only in relation to out-turn costs & Net Present Value.

Amongst the best benchmarking tools identified are Carbon Buzz (www.CarbonBuzz.org), the recent High Performing Property Programme delivered in partnership with IPD (“Better measurement – better management”), and many commercial benchmarking systems such as the Leesman Index. By definition these tools are used over the period of occupation/use.
Impact / Return on Investment

All those engaged in this brief study support the concept of POE as a key part of ‘closing the loop’ that ensures capital investment is driven by user need and proven operational performance. Many European public authorities have POE-related policies or guidelines as most believe benefits exist.

Some financial benefits are more easily defined and measured than others – for example, energy savings & carbon reductions often far exceed the investment required for sub-metering and targeted action based on the localized data obtained. A private sector company saved £222,000 after investing £74,000 in sub-metering and reporting for its offices.

The most progressive European public authorities that invest in the systematic evaluation and utilization of ‘in use’ occupier and building performance data to drive continuous improvement consistently report better value for money, capital & operational cost reductions, and occupier satisfaction.

Together these and others show the compelling case for greater use of POE as part of an integrated approach to building performance evaluation. Moreover, it shows that an integrated approach which puts users’ needs at the centre of design, construction, and operation of assets consistently delivers considerable returns on investment.

However collecting ‘in use’ data is only the start of the process and can be seen as a costly overhead that adds little or no value if it is not used by those collecting it or by others in the organization. It is the apparent financial and cultural disconnect within and between organizations that reduces the use of POE and the recognized savings available.

Robust financial evidence following building performance evaluation is surprisingly rare. Many product manufacturers, designers and even constructors make ‘in use’ performance projections, but few have obtained actual in-use performance data as they cease commercial involvement at project handover. Clients have better access to such facilities data/intelligence but focus on their core business purpose – yet few understand the impact facilities have on performance. The UK’s Technology Strategy Board is investing heavily in a 5 year Building Performance Evaluation programme to overcome this; no European counterparts are known to exist though presume they do.

Key barriers

Every public authority holds practical completion reviews soon after handover before signing the relevant contract documents that trigger final payments. Yet the systematic use of POE is very low. There are a number of inter-related factors consistently reported including:

- Property can be a low priority for an organization as only a fraction of expenditure – few decision makers understand the huge impact facilities have on occupier productivity.

- Disconnect between those that procure, provide and use a building – so encourages localized departmental cost-cutting despite consequence on others within the same organisation. A systematic approach to Whole Life Value that strategically connects capital investment, in-use costs and occupier performance is still seems surprisingly rare.

- Perceived as an overhead that benefits others, so no one team is willing to pay.

- Time pressure on staff time and project programmes – no time to ‘plan’, just ‘do’ – they simply move on to the next project without evaluating the performance of existing or recent projects or their occupiers.
SCI-Network: An insight into Post Occupancy Evaluation

- No mandate or requirement from a senior person or organization – so POE is treated an 'optional extra' rather than 'critical input'.

- Disconnect between similar projects and organizations – preventing comparisons & shared learning. This leaves POE open to being a data gathering exercise without any specific action arising from it – dramatically undermining the value against cost incurred.

- Fear of being associated with a poor performing project – it is better not to ask than have to deny/distance themselves.

- Relative to a building's design life of +25 years, public authorities have a very short timeline, whether for budgetary planning or political office. This drives short term thinking and decision making.

- Few public authorities appear to have a senior executive who visibly ensures the core business function drives adequate investment and monitoring of the facilities it uses.

- Even fewer systematically invest even limited resources to regularly monitor and assess the occupiers' satisfaction with the facilities that they use.

- Limited awareness/use of 'in use' performance benchmarking systems – they exist within government departments but rarely between them. Some commercial systems exist for benchmarking occupier surveys. Care should be taken to ensure comparability.

- Trust and openness to allow candid sharing of lessons learnt without fear of litigation or consequence.

- Fear of creating unrealistic user expectations following surveys etc. However others taking a proactive approach are confident it will provide helpful insight and promote innovation to maximize value and functionality from the available estate.

- Beyond 3-6 months of project handover, the design and construction teams have dispersed onto other projects and or have lost their commercial interest in that project as the final account would have been paid.

Conclusions & recommendations

Whilst almost every public authority engaged in this short study were aware of Post Occupancy Evaluation and the benefits it brings, the majority still aspired to have POE-based integrated policies and systematic working practices to drive better capital investment and asset utilization.

There are many and varied reasons for this limited use. A number of these are cultural or organizational. Some stem from a poor understanding of the contribution that a well-organized, efficient and effective working environment can have to the well-being and productivity of the workforce and to on-going efficiency savings. "Institutional separation" appears to be widespread – pressure on individual teams forces short-term behaviour that is counter-productive to the wider organization. And few authorities have mandated the use of POE and hold to account a senior executive that is responsible for visibly connecting or reconnecting budgets and responsibility for built assets to the occupier’s needs and over-arching business goals.
Stemming from this short study, our recommendations are as follows:

- The profile of POE as a key measurement tool needs to be raised (and in some cases, confirmed) across all European public authorities. The means of doing this could take the form of a guide or publication that sets out clearly the advantages and benefits of using this tool, and the forms that POE might take to avoid the risk of seeming to impose a “one solution fits all”.

- The use of POE should be a standard requirement of all construction and facilities management project briefs and terms of contract. A standard form of wording should be developed that recognizes the need for POE to be undertaken at key stages of the life of the building post construction or major refurbishment completion.

- A senior executive should be nominated in each organization with the responsibility for ensuring that POE measurement is undertaken and that the operation of the individual building and wider property portfolio are integral to the organization’s strategic business goals.

- In use performance data needs to be better benchmarked against similar organizations and assets. Key lessons arising from occupancy reviews and project reviews should be openly and suitably shared to ensure sustainable construction and innovation becomes the norm.

- Organizations bidding for funding and contracts should do so based on clear evidenced user need and high in-use performance predictability. Contractual terms and business models may need to change to reflect actual in-use performance rather than initial predictions.
Organisations contributing to this report

The following organisations were consulted and contributed examples, views or comments. Together these provided some of the context and content of the report. It should be noted that whilst these contributions informed the report, these organisations have not formally endorsed this report.

- Constructing Excellence
- Hub Professional Services Ltd
- Aberdeenshire Council
- Locum AB, Sweden
- Transport For London
- Aziend Sanitaria Locale
- Chartered Institute of Public Finance Auditors
- Fife Council
- Warwickshire County Council
- Appleyards Group Artilia
- Royal Borough of Kensington & Chelsea
- Max Fordham LLP
- Torfaen County Borough Council
- FM Team, Government Property Unt, Cabinet Office, UK Government
- Somerset County Council
- Ceredigion County Council
- SINTEF
- TNO, Netherlands
- Durham University
- Clackmannanshire Council
- Birmingham City Council
- Scottish Government Health Directorates
- Broadway Malyan
- Vale of Glamorgan Council
- Bundesimmobilienesellschaft, Austria
- Provelio
- SGS
- Danish Building and Property Agency
- South Eastern Education and Library Board
- Oaklee HA Ltd
- Environment Agency
- Camden Council
- Davis Langdon
- Construction Sector Network
- South East Centre for the Built Environment
- Senaatti, Finland
- Rijksgebouwdienst, the Dutch Government Buildings Agency
- Association of University Directors of Estates
- Carbon Buzz
- Scottish Funding Council
- East Sussex County Council
- BSRIA
Reading List on Post Occupancy Evaluation

The following list Reading List on Post Occupancy Evaluation was published by the Health Planning & Management Library of the Australian College of Health Service Management for an unknown purpose and independent of SCI-Network. However it may contain some useful references; apologies for 'broken' links.

Healthcare building design frequently involves complex concepts which are difficult to measure and evaluate. The AEDET Evolution evaluates a design by posing a series of clear, non-technical statements, encompassing the three key areas of Impact, Build Quality and Functionality.


**Building Evaluation**

**Built Environment Evaluation: Conceptual basis, benefits and uses**

**Calling Occupants**
The problem of obtaining valid and practical post-occupancy evaluation studies could have a solution in a pioneering user survey method

**Consulting Patients is a Virtue**
A Finnish research project that demonstrated the great effect that environment has on patients

**The Design Brief Framework for PFI Public Sector Comparators at OBC Stage**, 2004

**Development and Evaluation of a Consumer's Guide to Residential Aged Care**

**Diagnostic and Treatment Centres: ACAD, Central Middlesex Hospital: An Evaluation**

**Evaluating Building Performance in Healthcare Facilities: An Organisational Perspective**
An innovative methodology has been developed for conducting comprehensive performance evaluations in public sector health facilities in Canada. The balanced scorecard is the underlying theoretical framework for this initiative.

**Evaluating Health Care Facilities**

**Evaluation of Planning and Implementation for an Innovative Health Centre**

**Evaluation of the Built Environment: Staff and Family satisfaction Pre- and Post-occupancy of the Children’s Hospital (The Children’s Hospital, Denver Colorado)**
SCI-Network: An insight into Post Occupancy Evaluation


Facility Performance Evaluation
Whole Building Design Guide
http://www.wbdg.org/resources/fpe.php

Good Data Critical to a Successful Outcome
Ken Liddell, NSW Health, draws on his experience to consider some of the challenges, especially in gleaning all the necessary information from multiple sources, which await those wishing to undertake a post-occupancy evaluation.

Good Practice Guide: Learning Lessons from Post-Project Evaluation
UK Department of Health, January 2002
http://www.dh.gov.uk/assetRoot/04/02/10/59/04021059.pdf

Goodness on the Inside
Looks at how to evaluate Residential Aged Care Facilities interiors after the residents have moved in.

Guide to Post Occupancy Evaluation
HEFCE, 2006
http://www.smg.ac.uk/documents/POEBrochureFinal06.pdf

Health Buildings Evaluation Manual

Health Facility Economic Appraisal Guidelines
NSW Health, Capital & Infrastructure Services Branch, North Sydney, NSW Health, 1995

History Lessons: How Post-occupancy Evaluations Can Benefit Interior Design Projects

April 2008

Importance of Worker, Staff and Patient Participation in Hospital Evaluation
Kotaka, F and Manildo, F, World Hospitals & Health Services, Vol. 35(3) 1999 pp. 20-3

In Praise of Appraisal
Willetts, Paul, World Health Design, July 2008 p.74
The best way to see how a new building is performing is to evaluate it, so why do so many healthcare providers choose not to bother?
http://www.worldhealthdesign.com/In-praise-of-appraisal.aspx

Learning from our Buildings: A State of the Practice Summary of Post Occupancy Evaluation
USA Federal Facilities Council, Washington, DC, National Academies Press, 2002
http://books.nap.edu/books/0309076110/html/index.html

MARU Primer: Evaluation Studies
Medical Architecture Research Unit
http://www1.lsbu.ac.uk/maru/docs/EvaluationStudies_Primer.pdf
A Model Approach to Identifying Priorities
Sellars, Peter and Baillie, Jonathan, *Health Estate Journal*, Vol. 64(7) August 2010 pp. 52-54
The new NHS Premises Assurance Model (NHS PAM)
http://www.dh.gov.uk/en/Publicationsandstatistics/Lettersandcirculars/Dearcolleagueletters/DH_115071

NHS Premises Assurance Model (PAM) Metrics
UK Department of Health Facilities Estates and Facilities Division, Universal Version, July 2011
The NHS PAM is a management tool, designed to provide a nationally consistent approach to evaluating NHS premises performance against a set of national indicators.

NSW Health Facility Guidelines: Post Occupancy Evaluation Guideline
NSW Health, Draft Issue May 2004

Phiri, Michael, January 2004

Piloting a Building Performance Evaluation Tool
Knudtson, Bev, Fontaine, Marie and Steinke, Claudia *Healthcare Design Magazine*, October 2011

Research Methods for Design Practitioners to Evaluate Facilities

Total Asset Management: Post Implementation Review Guideline
NSW Treasury, 2004

Post Occupancy Evaluation
Billions are spent on providing new facilities yet the evaluation of services and buildings has received scant attention in Australia.

Post Occupancy Evaluation
Capital Development Guidelines, VIC Department of Health
http://www.capital.dhs.vic.gov.au/capdev/ProjectDelivery/PostOccupancyEvaluation/

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