

**SPECIAL ISSUE ON
POST OCCUPANCY
EVALUATION**
Issue 69, August 24, 2001

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WHAT IT TAKES TO BE

AN INTELLIGENT CLIENT

In this issue we look at **POST OCCUPANCY EVALUATION** and, particularly at a very successful UK research project—PROBE (Post occupancy Review of Buildings and their Engineering)

At the invitation of Richard Lorch, Editor of *Building, Research & Information* we review their special Post Occupancy Evaluation issue (Vol 29, #2, March-April 2001). This issue of BRI is the most useful collation of published work on POE that you will find anywhere, written by the specialists who designed and conducted the research. If you manage buildings, the findings will be of great interest to you. But whether you manage building or non-building assets, the techniques used and the rigour of the approach adopted will be invaluable in your own efforts to create “a corporate memory”

Post Occupancy Evaluation is for

- Designers
- Builders
- Managers
- And you, as an intelligent client!

1. What is Probe?

Probe started in the UK in 1995. For the first time recently-completed buildings of interest to design professionals were visited a few years after completion and techni-

*Researched and written by Dr Penny Burns, AMQ International.
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AMQ Intenational
PO Box 75 Salisbury South Australia
Tel 618 8258 4342 Fax 618 8281 5795
Email: sam@amqi.com Website: www.amqi.com

cal and social aspects were surveyed and assessed in a comprehensive, systematic and affordable manner. Each study was then published in a professional journal, the *Building Science Journal* (the magazine of the Chartered Institution of Building Services Engineers).

The studies were co-funded by the Department of Environment, Transport and the Regions and the Journal and the design and conduct of the studies was carried out by the Probe team of industry specialists. In this special *Building Research & Information* Issue, there are five papers by these industry specialists providing an in depth view of the Probe process, its technical data, social assessments, and the strategic lessons learned from the sixteen buildings surveyed between 1995 and 1999.

The Probe team has also established a database of

buildings for comparison: not just the published surveys, but statistics from other studies done for private clients using the same survey techniques. The occupant survey benchmarks are based on a moving average of the last 50 UK buildings surveyed.

2. Why did Probe succeed where so many have failed?

One might expect that 'the owners, occupiers, builders and designers of the buildings under examination might find any adverse findings damaging to their reputations and livelihoods and either forbid publication or finish up taking the publishers and authors to court'.

Why didn't this happen? The answer is that since the Probe team chose buildings that had already 'been carefully and clearly presented in the Building Science Journal as state of the art designs', very few building owners

The industry background for Probe - ring any bells?

'Building in Britain has inherited from the past a fragmented structure, a reluctance to change and very little in the way of feedback and monitoring – an industry suffering from a kind of collective amnesia. It is riddled with bad communications; although there are exceptions it is generally true that designers don't trust builders, contractors don't trust sub-contractors and suppliers; architects don't trust engineers; good craftsmen are a dying breed and very few people, including the clients, understand the real needs of the people who use buildings'¹

refused. 'Furthermore, the Editor, who must have been no mean diplomat, had already established a relationship of mutual trust with the clients and promised the opportunity of a factual review of each report before it was published and subsequently to comment in the Journal.

At intervals throughout the project, round-table discussions were held with groups of clients and their design teams at which the atmosphere of open information and collective learning was apparently appreciated by all.'¹

3. How were the buildings chosen?

'Probe 1 investigated eight buildings: four air conditioned offices, three educational buildings with advanced natural ventilation and a low-energy medical centre. Each building had been reviewed in the BSJ at the time of completion between two and five years earlier.

From the 25 or so candidates each for Probes 1 and 2, the team produced long lists of about 12 buildings. These were selected on the basis of their technical interest, the team's background knowledge of performance (only potentially well-performing buildings were long listed), and to provide a reasonable cross-section of building types, users, technologies and designers.

Of the buildings followed up, about one third fell away, most often because the occupiers could not spare the time to support the exercise or owing to unresolved technical problems. Speculative buildings were under-represented, not only were they less frequently covered in the BSJ, but they gave permission less easily because both landlord and tenants had to agree; and one building – and sadly the only refurbishment – had yet to find a tenant."²

TECHNICAL ISSUES

1. Diversity of usage

'Buildings today tend to be less routinely occupied – with out-of-hours use, flexible working hours, and so on; and contain an increasingly wide range of activities and equipment. Briefs and designs, however, have often assumed (explicitly or implicitly) more routine operation. This tends to lead to services which find it difficult to adjust smoothly to changes in occupancy, use and load; and tend to default to on. *Services need either to be more responsive to changing demands, or to be so efficient and low-powered that they can operate gently and economically in the background as with the heating, ventilation and cooling at FRY*³ [note: all buildings are identified with code letters]

2. Manageability

'In the larger financial services buildings...facilities and engineering staff were properly resourced....In most of the other buildings, the building services and environmental control systems demanded more than their occupiers (or the contractors they employed) were able to provide, or regarded as necessary or affordable. While there may be a misfit between occupant expectations and reality, unless high levels of facilities and engineering management can be assured, *designers must also try to make buildings less complicated, easier to look after, with systems which are well-integrated but preferably non-interacting; and controls which are effective and easy to use.*³



3. Controls and usability shortcomings

'Widespread shortcomings leading to occupant dissatisfaction, management frustration, and often energy wastage: for example through unnecessary or extravagant operation of systems and poor use of daylight. Recent buildings often seem to deprive occupants of choice, increasing dependence on management and technical systems, and causing lower perceived control scores in occupant surveys. *Controls need to be made more usable, with occupants being allowed to be more involved in choices where appropriate. People are usually better than automated systems in knowing when they want something, while automation is better at avoiding unnecessary extravagance.*

4. Maintenance access

This was sometimes poor, for example with plant in cramped or remote spaces; zone pumps, terminals and control equipment hidden in crawl spaces or

behind fragile access panels with screw holes filled and painted over; luminaries, security and fire detectors, and environmental sensors difficult to reach at high level; and inaccessible motorized windows and dampers for aNV. This delayed and complicated servicing, adjustments and repairs; sometimes required special access equipment and safety precautions; and so increased the reluctance of many managers to intervene. *Safe and adequate access is essential.*³

5. Other Issues

Other concerns included the pitfalls of innovation, rushed handovers. The industry was found not to be good at dealing with problems after practical completion even though 'for some aspects, particularly operation and controls, it may be impossible to understand and fine tune performance until the building is occupied and its management begins to take control.'

GOOD BENCHMARKING IS OBJECTIVE, RELIABLE, GRAPHIC, ANALYTICAL

1. Objective

To produce reports of sufficient rigour and credibility that both successes and problems may be published takes some doing—specifically it requires

- Standardised tools
- Established techniques (and trained investigators) and
- Benchmarks

The Probe study used two established tools:

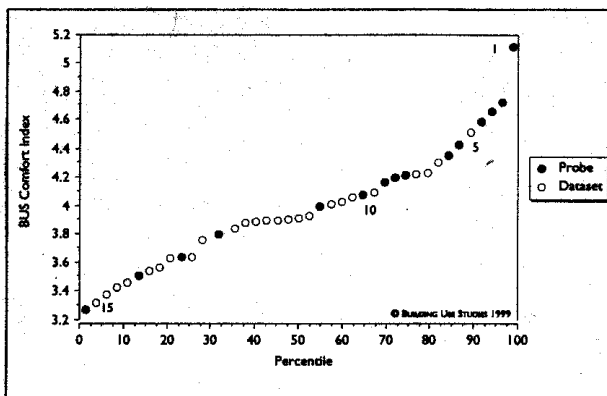
- The occupant survey method developed by Building Use Studies Ltd (BUS) to gauge occupant satisfaction with the building and its internal conditions.
- A prototype of the Energy Assessment and Reporting Method's (EARM™) Office Assessment Method for its analysis of energy use. The Probe team assisted its development and testing. A spreadsheet version with accompanying guidance has now been published (CIBSE,1999)⁷

2. Reliable

As an example, consider the “Building Comfort Index” below. Not only does it use the standardised tools throughout the Probe research project, but because these tools are also established techniques used elsewhere, the research team was able to draw on wider industry research in establishing the benchmarks. In the illustration below, the filled circles represent information gathered from the Probe research while the unfilled circles represent general industry data gathered by using the very same techniques in a wider industry setting.

The study limited its scope to ensure that those aspects of buildings that it could measure reasonably accurately were not diluted by inclusion of other aspects which, while of interest, could not be reliably measured or wider industry benchmarks obtained. (see “Can Probe be reproduced?” on page 133)

3. Graphic



Source: Building Research & Information (2001) 29 (2) p.131

Note: All of the Probe buildings in this graphic are identified in an accompanying table by code letters which relate to the photographs of the buildings given earlier so that their position on the graph can be understood in the light of the context.

4. Analytical—Energy Performance of Buildings

‘Amongst the findings were that:

- Energy use was often higher than anticipated, particularly in the buildings and areas with high levels of servicing
- ‘Nearly all Probe buildings claimed to be energy efficient. However, the studies revealed less of thorough going approach to energy in briefing, design, construction and management than might have been expected.’
- There was ‘a trend towards full fresh-air ventilation, sometimes at high volumes and with no heat recovery’
- There was increased use of humidification – usually with sterile steam for health reasons and often electrically generated.. and ‘were operated unnecessarily and wastefully’.
- Lighting energy use tended to be lowest in the simpler buildings.’⁴

BENEFITS AND BARRIERS

1. Benefits

- 'Increase in organisational effectiveness, which can be influenced positively or negatively by a space.
- Information to support continuous improvement
- Buildings become 'a better fit' with organisational need
- Benefits are perceived differently by user and designer, POE helps to provide a form of communication
- Reduced owning and operating costs
- Increased competitive advantage – other resources are being 'tweaked' to provide increased benefit, but not buildings!

2. Barriers

Amongst the barriers were

- It is not part of yet part of 'standard practice'
- With many participants in the building process there are 'split incentives'
- Lack of indicators and measures⁸

3. Facility Management attitude

Post occupancy evaluations are low on the priority list for UK-based FMs. Reasons given include lack of finance, lack of time, 'fire fighting' habits, insufficient 'clout', FMs are 'spread too thin', and there are few authoritative measurement methods. Then there is the move to outsourcing. "outsourced organisations tend to be bad at responding when confronted with anything that challenges their normal way of thinking – they like to deal with the standard situation. This bodes ill for innovation!"⁹ What can then be done? Read this reference and find out!

4. liSBE: the International Initiative for Sustainable Built Environment, is a new international organisation to co-ordinate the research, development, innovation, validation and dissemination for sustainability in the built environment. Its purpose, rationale, scope, objectives and benefits are briefly discussed in this paper. See Ref 11.

CAN PROBE BE REPRODUCED?

1. What it requires

Probe's 'evolving techniques have become streamlined and standardized. However it still depends on a small team of highly experienced assessors. For Post-Occupancy Evaluations (POEs) to become more commonplace whilst maintaining their rigour and consistency, it will need commitment, effective training and accreditation programmes, with arrangements for collating high-quality survey information and maintaining benchmarks'

2. Beyond Buildings

The 'feedback loop' in the diagram on the back page shows how POE findings can be incorporated into strategies for procuring, occupying and managing buildings [and other assets], 'helping to create virtuous circles of continuous improvement.

Could clients, design and building teams do this routinely as a normal part of the follow-through on a project, so assisting rapid continuous improvement of building performance? So far there has been considerable interest but relatively little activity, for the following reasons:

But be Aware!

3. Research can easily fail to deliver.

Probe has been underpinned by three established methods – for occupant feedback, energy analysis and airtightness. So far it has not included, for example, space utilization, costs-in-use, or aesthetics, all of which might be part of a fully-rounded POE. Why? Because including these would have made the project unmanageable within the available resources; and because there were no tried and tested methods and benchmarks that we could rely upon.

CAN PROBE BE REPRODUCED? (CONT)

4. Professionals are wary of POEs

'Professionals are wary of POEs because they think that the findings – which inevitably bring both good and bad news – may not enhance their reputations. In fact, we usually find the reverse. Involvement in feedback can demonstrate to their own organisations, their peers and the outside world that they are seeking improvement by getting involved in understanding how the buildings they procure, design and manage really work for the users.

5. Who Pays for the Survey?

Probe has been paid for by the government and the publisher, with additional time given free by the occupiers of the buildings and the survey team. Similar – but unpublished – studies have been undertaken for owner clients and developers, but not in large numbers. Designers appear reluctant to fund POEs.

6. Who Pays to Implement the Findings?

The purpose of Probe has been to extract, through studies of specific buildings, findings that will interest the supply side of the industry – initially largely designers – and help them to build on successes and to address common shortcomings. Probes 1 and 2 had no funding to follow through into helping the occupiers to improve the performance of the buildings studied. In some of the more intensively-managed buildings, they have done this themselves. In most of the others they have not, even though minor changes could sometimes have made significant improvements.

7. Benchmarking.

To be credible, POEs need reasonably large samples of buildings and yardsticks with which to compare them. This means a continuous programme of data gathering from the survey and data management. It is easy to under-estimate the resources, ongoing diligence and quality control required to sustain such a programme of work.¹⁶

USING THE PROBE FINDINGS

'There are major benefits in undertaking feedback routinely on every project, ideally this would become commonplace. However, many generic issues have already emerged which can be tackled now.

[The work] on technical and energy performance, revealed that many buildings (even good ones) had recurrent problems – some relatively minor and correctable – which significantly increased energy consumption, or caused difficulties for management and occupants.

{The work} on the occupant surveys also revealed downward trends in thermal comfort, noise and perceived control; and misfits between the buildings now being produced and what occupants say they like.

New techniques could have unintended consequences and usability and manageability left much to be desired. Not only risks, but also success factors could easily be overlooked.

Much of Probe's findings support the results of earlier research, or ring true with anecdotal experience. Some say they reveal little new ... but if so, why have the earlier findings not led to improvement?

Not Just Innovation but Consolidation

Progress requires not just innovation (as some seem to think) but also steady consolidation and improvement; what is the point of 'new' research findings if the old ones have not been acted upon? If we genuinely want better all-round performance, we must appreciate and tackle the chronic problems and create a base of sound practice. This paper identifies some things which ought to be done in the way that buildings are briefed, procured, designed, built, completed, operated and managed; to help overcome chronic problems and to exploit factors for success.¹⁶

The positive messages from the buildings studied are that many solutions are not difficult to implement, and that improvements in occupant satisfaction, economic performance and sustainability do not have to conflict with each other, but can be mutually supportive contributors to the 'triple bottom line', in virtuous circles of continuous improvement.

There are good business reasons for tackling the chronic low-level problems – in particular better occupant satisfaction and economic and environmental performance – but the 'real' market drivers of time, money, business and property market agendas have tended to ignore them. ■

THE MAIN MESSAGES

ENDS What are buildings for?	LINKING TOOLS How can feedback make things better?	MEANS Is the response realistic and practical?
The public interest: health, safety, social benefits The triple bottom line: people, business, environment Added value: joy, humanity, dignity Strategy First Don't confuse means and ends. Define what you are about as an organisation. Be clear in the brief about objectives, performance and risk levels. Beware of property criteria dominating too much. Establish the Essentials What do you want to forget about? Seek good quality baseline requirements—essentials not just desirables Don't procure what you can't manage Targets are Always Moving Constantly review objectives and solutions. Consider change, volatility, and risk, and seek robust solutions. Avoid vicious circles: seek continuous improvement. Beware that the cure may be worse than the disease.	Methods of linking clients, service providers and regulation to improve understanding, products and performance in an environment of socio-technical change Keep Hold of Reality Manage the brief. Prescription should not trump performance. Identify and minimise downsides Question everything, undertake: reviews and reality checks, Share your Experiences Essentials to learn on the job Feedback internally and more widely Mechanism for disseminating attributable and unattributable items Adopt Open Source Data Benchmarking: start with the basics Measurement is key to effective results, but must be sensitive to context. Tag data with likely status. Cradle to grave monitoring and reporting.	Agendas for: Designers and providers of buildings and components Providers of outsourced services Get Real about Context Identify constraints (site, budget, culture..) Consider requirements, risk, relevance. Work to the occupiers' true capacities Own Problems, Don't Hide Them Tasks for the professionals. Tasks for the occupier's management What can be reasonably left to individual occupants? Less Can be More Make essential features of intrinsically efficient options Seek simplicity Beware of unnecessary technological complexity creating unwanted management burdens
Source: Building Research & Information (2001) 29 (2) p.154		

A resurgence of interest in POE.

'at present, the prevailing climate of opinion in Britain is ripe for a resurgence of interest in POE. This time, however, expressed interest in coming not from a single occupation group – such as architects – but from a sector-wide initiative jump started by an alliance between the UK government and clients with major property portfolios'.

POE has also been stimulated by the need to contain environmental damage.

It also suggests that there is a threefold re-emerging agenda for POE:

As a '**design aid** – as a means of improving building, procurement, particularly thorough 'feed-forward' into briefing

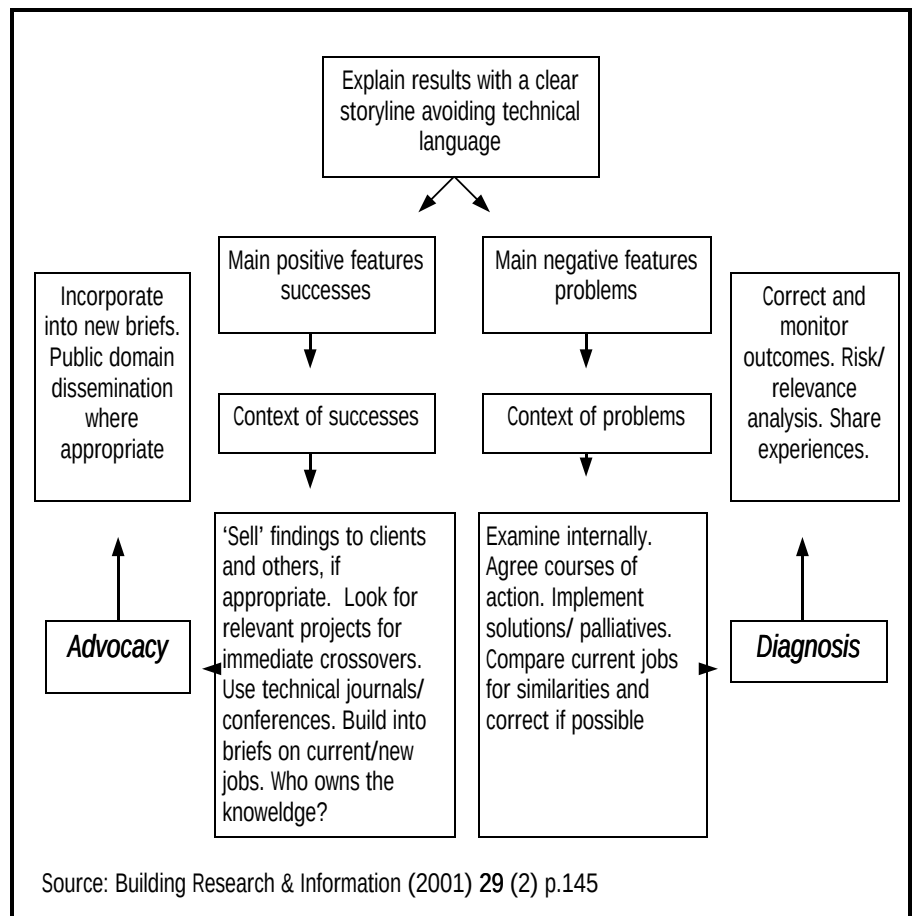
As a '**management aid** – as a 'feed-back' method for measuring building performance, particularly in relation to organisational efficiency and business productivity

As a '**benchmarking aid** for sustainable development – for measuring progress in the transition towards sustainable production and consumption of the built environment.' ¹⁰

CORPORATE MEMORY

I was speaking recently to an engineer in the British Underground where they have, over recent years, been renovating the tube stations. One of the stations benefitted from the experience of a senior maintenance supervisor who was able to advise on suitable finishes that would assist cleaning and prevention of vandalism. A later renovation was outsourced and the contractors did not call on the services of this maintenance supervisor. Fair enough! But the Underground had not incorporated their findings from the initial renovation in their 'corporate memory' and so were not able either to pass on the information to their contractor or to evaluate the work that was being done for them. In this respect they were not acting as an 'intelligent client'. The "feedback loop" opposite, if applied, will help to avoid this same mistake.

The Feedback Loop.



Further Resources

On the Web:

<http://www.tandf.co.uk./journals>
www.usablebuildings.co.uk/Probe/ProbeIndex.html

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