WALKING THE TIGHTROPE
The Probe team's response to comments in BR&I

Bill Bordass
William Bordass Associates, 10 Princess Road, London NW1 8JJ, UK
E-mail: bilbordass@aol.com

Adrian Leaman
Building Use Studies Ltd., 44 Newman Street, London W1P 3PA, UK
E-mail: adrianleaman@usablebuildings.co.uk

Robert Cohen
Energy for Sustainable Development, Overmoor, Neston, Corsham, Wiltshire SN13 9TZ, UK
E-mail: robert@esd.co.uk

Introduction

The Probe team is delighted that BRI's Special Issue on Post-Occupancy Evaluation (POE) has led to these important contributions from world experts in building performance. Monitoring and feedback are essential to learning and improvement. When innovating, you need to know how well you have done, to find out what you need to improve and if there are any unintended consequences[1]. Even if what you are doing is completely routine, feedback is essential to quality control. There are high costs in NOT undertaking effective feedback.

Although so necessary, feedback from completed buildings is rarely undertaken in the UK construction industry. But change is in the air, encouraged by government, which has:

- Included POE in its research business plan[2].
- Promoted the development of performance indicators of all kinds[3].
- Asked for air pressure and thermographic tests in changes to the Building Regulations[4].
- Included Building Regulations requirements for commissioning records, log books, and sub-metering of energy to tenancies and end-uses within a building. By improving the information available to management, this paves the way to future performance certification of new and existing buildings.
- Commissioned a range of studies[5], including Probe of course.

POE is beginning to be taken more seriously in other countries too[6]. Szigeti and Davis (2002) think that the BRI Special Issue may mark the turning point for building performance assessment. At last, feedback may soon become a mainstream activity for the building industry and its clients, driven by the need for continuous improvement, measured by the triple bottom line (social, economic and environmental) of sustainable performance, and supported by decades of previous work and the ever-increasing power of information and communication technology.

---

1 There nearly always are, as the history of research and development shows. Some reasons are discussed in E Tenner's book *Why Things Bite Back: New technology and the revenge effect*, London: 4th Estate (1996).

2 Part T of DETR's consultation document on research priorities (April 2001) identifies the following:
- Systematic organisation of building performance feedback.
- Considering market research and feedback techniques used in other industries.
- Overcoming disincentives to POE.
- Comparing actual use with design assumptions and identifying design lessons and pitfalls.
- Reviewing whether and how design assumptions remain valid over the life of an asset.
- How building performance can affect clients' core businesses.

3 The initial ones were largely on construction process, but 2001 sees the publication of indicators on sustainability and - more controversially - design quality.

4 The Building Regulations 2000 AD Part L, Conservation of fuel and power, interim draft (DETR, March 2001).

5 The Construction Research and Innovation Strategy Panel's website (www.crisp-uk.org.uk) contains new commissioned papers on design as a value generator, post-occupancy assessment, building-in long-term performance, and matching design assumptions to conditions in use.

6 For example a draft European Union Directive published in May 2001 calls for mandatory energy certification of existing buildings and identification of possible remedial measures.

Or will it be another false dawn? We think not. With increasing scientific understanding and the growing realisation of the capacities of Spaceship Earth, we can ignore feedback no longer. We are entering the Age of Consequences.

Walking the tightrope

Since Probe started in 1995, the team has been walking the tightrope. Actually several, between:

- Practical empirical results, and credibility with the zealots in the research community.
- Candid, concise information, but without sensationalism.
- Recognition of context: a clear statistical story without hiding behind technique[7].
- Using case studies as a window into current practice: informing managers and designers, recognising honest efforts to improve, and appreciating that innovation takes courage, and a pioneering spirit prepared to risk any downsides.

We have focused on things which can be directly affected by building design, briefing /programming, construction quality and building management. We have kept our distance from emotionally-charged things like organisational behaviour and design quality.

By publishing the original Probe articles in the *Building Services Journal* (BSJ), a relatively niche market but professionally well-respected journal - we were able to put the findings in the public domain without being scorched by the limelight. Roderic Bunn - BSJ's editor until recently - pioneered this approach and has steadfastly supported the team through now six years of studies. The BSJ has also promoted the emerging issues, particularly benchmarking and sustainability.

The papers in the BRI special issue have now exposed the findings from the first sixteen building studies in BSJ to a more international and academic audience. We are delighted with the response the issue has raised and gratified that our efforts have generally withstood the spotlight of peer review. The editor has invited us to reflect on some of the comments made.

Baird's commentary

When Baird (2001) started research in the 1960s, he assumed POE was routine, but was soon disabused when he joined a school of architecture[8]. POE nevertheless developed as a worldwide research activity - not all countries got stuck in the doldrums Cooper (2001) describes for the UK.

Baird welcomes the Probe studies as signs of a POE renaissance in the UK, but laments Probe having been "lost" - at least until recently[9] - in the pages of BSJ; a point also made by Whyte and Gann (2001) This raises some interesting questions. For example:

- Was BSJ a constraint, or an incubator? It seems unlikely that something like this could have been launched - let alone sustained - in a mainstream architectural or property journal[10].
- Without tight copyright, how does one keep control over the re-use of such potentially sensitive material? As described by the authors (Cohen et al 2001), a headline-catching distillation entitled *Winners and Losers* in another journal led to the threat of legal action.
- How does one undertake such public interest projects in a research climate which insists on joint government/industry funding? BSJ was the co-funder and so - not surprisingly - wished to guard its publication rights.

---

7 For instance, we try not to normalise data, as this can introduce more problems than it solves.
8 Although they were probably more committed to it then than most are now!
9 Since late 1999, much of the Probe material has been available on the web, see www.usablebuildings. co uk Extracts and distillations have also been published in many other places.
10 However, having established credibility, we are now discussing a future Probe series with some of these journals.

Probe's findings also seem to ring true in other parts of the world:

- Baird thinks he could draw virtually the same conclusions in New Zealand.
- Zimmerman and Martin (2001) find similar things in North America. So does Preiser (2001), who thinks that increased international networking could bring enormous benefits.
- TVVL Magazine[11] wants to republish the articles to help designers in the Netherlands.

Many people ask for POEs to be quick, simple and cheap. At the same time they criticise Probe as too focused on the energy-engineering-comfort agenda. In fact, it covers many angles - certainly more than most POEs to date. The energy, technical and occupant surveys are generally applicable and provide the bedrock from which a one can begin to tackle a whole range of topics from a wide range of perspectives: developer, investor, designer, manufacturer, builder, occupier, facilities manager and government. They also open up a whole range of other issues (as the reports show), in a relatively non-threatening way. As Baird comments, how many studies to date have done even this and put the results in the public domain; and how many other techniques are simple and robust enough to be added? We agree with him that more components may mean less chance of success.

Fisk's commentary

Fisk (2001) examines the role for feedback in the context of sustainable development. He highlights:

- *The importance of the strategic role*
  We thoroughly agree. Indeed, about one third of Probe's published outputs have been about consequences, goals and outcomes.
- *Uncertainty about the tactical role*
  Fisk asks how many people improve their driving habits after observing the bad habits of others?[12] However, with will and good information, we think good building performance could quickly be made a badge of good management.
- *The bigger picture*
  For example, an energy efficient building in an out-of-the-way location may be less sustainable than a gas-guzzler next to a transit station. While this is undoubtedly true, a good location is no excuse for an unnecessarily wasteful building[13].
- *It is more important for a building to have potential to perform well tomorrow than necessarily to do so today.* Yes, indeed. However opportunities to build in that potential are being squandered as designers fly blind (Bordass 2001a) and do not know what is capable of working, and whether the elements of that future potential are truly present.

Fisk says that organisations find the procurement and adaptation of buildings a boardroom headache; and that for them the Probe findings will not be reassuring. However, on the positive side, Probe does provide strategic and tactical insights to help informed clients procure better and more robust buildings - in Fisk's terms, with less novelty and more innovation. But Fisk also wonders what happened to the informed client: why do simple but awkward commonsense questions - at least in hindsight - not seem to have been asked? Here, we think, design brief management and the means-and-ends dialogue discussed by the authors (Bordass et al, 2001) can come to the rescue[14]. However, some clients are just too busy.

---

11 The equivalent of BSJ in The Netherlands.

12 More to the point, perhaps, is the UK's routine annual "MoT" roadworthiness and emissions test on road vehicles.

13 The Probe studies themselves did not ignore such transport issues. However, they did not find their way into the BRI review papers, which focused on the performance of the buildings themselves.

14 Clients might- and indeed many do - assume that a good design team should know what questions to ask. Sadly, however, psychic designers are few; and those well-informed by POEs not much more plentiful!

Fisk thinks that Cooper's question *Who owns POE?* can be taken up at a tactical level in the management of in-house and outsourced facilities management services. This makes sense, but Eley (2001) was cautious. Certainly our recent experience has been disappointing, partly because the necessary services and benchmarking activities seldom form part of standard facilities management contracts. However, this must eventually happen as FM becomes more professional and its customers more demanding. Could the UK government client perhaps take the lead here?

Whyte and Gann's commentary

Some of Whyte and Gann's points seem to mirror the differences between the academic and real-world research approaches identified by Robson (see figure 4 of Bordass et al (2001)). "The best is the enemy of the good" seems to apply forcefully to POE, and is perhaps one reason why promising university research in this area has found it more difficult to deliver than anyone had anticipated.

On the points raised:

- *Do the buildings represent the norm?*
  This is a drawback in the eyes of some, but we do not agonise about it. Our practical experience of building studies tells us that you take what is on offer. If you worry too much about representativeness, the methodology will paralyse you (it has with many studies which take academic criteria too seriously and do not pay enough attention to the real world). We do not pretend the Probe buildings or the reference dataset are statistically representative. But how important is this? More important, we think, is that the dataset for most parameters extends across a wide range of the available scales. From these, we have then sought to identify the factors for success (the exceptions that prove the rule); and to help avoid things that regularly go wrong, even in buildings which aim to be good. In drawing our conclusions, we also seem to have struck an international resonance.

- *Feedback against design intent*
  While clearly useful, this introduces a degree of relativism which makes benchmarking more difficult[15]. It also relies on information which is often not available to a surveyor[16]. In addition, many things which we find add or subtract value were not an explicit part of client requirements or design intent. As Markus (2001) says, the prescription needs to match the description. It seldom does.

- *Technology/management interactions*
  Our two-dimensional approach is deliberately simplistic in order to engage the attention of people like designers and clients who are not normally interested in such things. This is what works in real-world situations, such as meetings in which decisions are being made, and where one must rapidly engage the attention of those present. It would be interesting indeed to see how the conclusions of Probe fit into the wider literature on management and technical innovation, but we were not funded to do this. We also introduced some insights from other fields, which we have not seen in the building innovation literature.

- *The need to repeat POE over the life cycle.*
  Though this is clearly desirable, at present very few organisations do it even once. First we need to establish and consolidate the bridgeheads.

15 Ideally one would benchmark both the client/design requirements and the outcomes on an absolute scale. For some attributes, the functionality and serviceability standards discussed by Szigeti and Davis [REF) already do this.

16 For example, requirements evolve but are not recorded in writing in one place, or frequently at all.

Markus's commentary

It must depress Tom Markus, a UK pioneer of building performance assessment, that after nearly half a century such activity is not routine, and does not always build on the foundations he helped to create. The same applies to multidisciplinary design, of which the introducer of the BRI special issue - Sir Andrew Derbyshire's[17] firm was one of the leaders. In the 1960s, the scientific basis for briefing and architectural design was in its heyday. In the 1970s this began to be undermined by disillusionment and in the 1980s by market pressures. Only now is it being rediscovered, but in a somewhat different form[18]. Is building the only industry whose progress follows such a "forgetting curve"?

We wonder if Markus regards the Probe team as just as forgetful as everybody else[19]. However, by not building directly on the foundations built by Markus and others, Probe may have opened-up a short-cut to improving the uptake of POE. This be an example of the path-dependence of innovation (or the lack of it) discussed by Whyte and Gann (2001). Probe's origins were not in research, but in publication and consultancy. It was 50% government-funded not as a research project, but an initiative to improve innovation in the industry. Its validity came from the convergence of four proven streams of single-issue activity - energy surveys, occupant surveys, publication, and design advice/computer modelling. However, Probe was aware of its antecedents, and most Probe team members - although practising as independent consultants - had both multidisciplinary design and academic research experience, and an interest in the strategic implications of their detailed findings.

Probe's emphasis - rightly or wrongly - was on production rather than reflection, and on usable approximations not theoretical developments. We had to use proven (though relatively recent), robust (though not yet widely used) tools. To suggest that we missed an opportunity to develop new models is off-beam for a process which had to deliver public domain critiques, one by one, to a tight time programme and cost budget. Only afterwards has the team been able to step back and to begin to relate our real-world activities to the world of university research. We hope that the BRI special issue may have helped these two paths of investigation to converge, and to accelerate the consolidation of POE techniques and their adoption in a wider and more receptive market.

THE PROBE OCCUPANT SURVEYS

Markus is critical of Probe's occupant survey, its simplicity and its emphasis on the physical environment. Partly this again represents path-dependence: the Probe survey evolved from studies of building-related ill-health. It was then stripped down to the bone to make it routinely affordable in a project which had initially been budgeted to include only the occasional occupant survey.

In fact, this parsimony proved to be a blessing. A simple, robust method not only obtains the data efficiently, but helps to convince the sceptics. One cannot over-emphasise how difficult buildings are to study properly. They are "complex dynamic open systems", with hundreds of apparently relevant variables. In addition to the complexity of the buildings and occupants, contexts change as well: e.g. site, design, procurement, ownership, history, aesthetics, use, and management. A university researcher must try to to account for all this variety: a particular item may be relevant in a particular case, but in advance you cannot tell which. However, if you let the variety dominate, you are overwhelmed by a mountain of data. Statistical methods such as multivariate analysis do not always help to re-establish order: they can also make things worse by reorganising the complexity and serving it back all jumbled-up.

In general, we have found it best to use simple, stripped-down statistics which tell a simple story clearly (we call them "Shaker statistics"), or to have good "question-answering ability" where the data give unambiguous answers to simply-defined questions. Over the years, we have learnt which of the multitude of variables are most likely to yield useful results in pinpointing whether buildings work well or not. So we prefer to use "need to know" questions rather than "nice to have", which is one of the reasons why we now keep our questionnaires to just two A4 pages[20]. We are aware of the importance of context, but prefer to describe it than to control for it. We let readers make up their own minds about relevance and importance: perceptions differ, and change with time.

---

17 Derbyshire was also one of the authors of the 1963 RIBA Plan of Work which recommended routine post-occupancy assessments. This was omitted from the 1973 edition owing to lack of uptake.

18 *Architects are into certainty, but we're no longer certain* .... Piers Gough, quoted in the Architects' Journal.

19 Or maybe - like Baird - he appreciates how patient we have been when confronted by "the same errors and omissions perpetrated time and again".

20 We also have an internet version (with the same number of questions as the paper version but which looks longer owing to the lack of onscreen control), but we only use it as a back-up because response rates are usually much lower.

We are in favour of open systems and appreciate Markus's concern that the Probe questionnaire form was not published. But there is method in our apparent lack of openness. The main reason we licence the questionnaire (and not just make it freely available) is to manage the feedback loop more effectively. A licence (which is free to postgraduate students, with a fee charged to others) gives recipients the latest version of the questionnaire and a pre-formatted data entry file.

This helps us to:

- Keep in touch with the most recent work and to identify trends.
- Develop a relationship with researchers carrying out the studies so they get the benefit of our experience. We, in exchange, get their data files, the statistics from which can then be anonymously added to the benchmark dataset.
- Get independent criticism from researchers developing and using the methodology.
- Publicise the findings on our website when allowed.
- Maintain strict confidentiality where necessary.

Without some form of licensing, we do not know who is using these techniques; surveys are implemented sloppily; questions get used and changed indiscriminately; scales get altered; quality control suffers; and the feedback loop is broken. The whole point is of the exercise is feedback, so the licensing arrangement helps "manage" the loop and to provide some funding for the essential exercise of data management.

Preiser's commentary

"The customer is king" characterises many successful modern industries, where effective feedback systems are a central part of normal business practice. Preiser (2001) is not alone in seeing the archaic construction industry as a supply-led dinosaur, which must adapt or succumb to newer, more nimble demand-fed companies that can manage the total customer experience. The empirical feedback methods used in Probe can potentially help both gazelles and dinosaurs to improve their products and services - and complement the more theoretical techniques which are more widely used in the USA (and which often have more emphasis on aesthetics).

But will "total property services" suit everybody? The car and IT industries which Preiser admires have hooked us on replacing our equipment regularly and having to spend relatively large amounts on maintenance, support, repairs and upgrades. How far can this apply to buildings? The approach suits best the 'Type A" environments see figure 1: relatively complex buildings needing high levels of support which the occupier is prepared to pay for. This class of occupier can also afford to delegate these tasks - if they so wish - to companies for which this activity is their core business. But what of the Type Bs: why would a service industry want to build the simple, robust, self-managing buildings which serve many occupiers so well? Or the ubiquitous Type Cs - particularly common in the public sector - where the building demands more than the occupier is prepared (or can afford) to provide? Recent history tells us that many such buildings have been prematurely demolished because their occupiers could not bear the costs of looking after them. Such obsolescence - and/or unreasonable financial drain - may be good for the construction industry, but not for sustainable development. Japanese practices may be admired, but Japan spends a much higher proportion of its GDP on buildings than we do: is this actually sustainable?

Preiser says that the costs of a POE are small in relation to the benefits, particularly for the long term building user. We agree. A life cycle 1:10:100 ratio (cost of building: cost of running building: cost of staff in building) is now widely quoted, viz Szigeti and Davis (2001). With such massive value added, why do people so often find POE difficult to justify? Reasons include:

- *A fragmented supply industry.*
  Design and building teams change from project to project. All members can benefit from POE, but without continuity no single player can afford to do it.

- *Fragmented customers.*
  The procuring client is often not the occupier; and the owner is often not the user.

- *Industry standards.*
  To improve fundability and tradeability, client requirements are increasingly dominated by mainstream market criteria. Increasing outsourcing of buildings and their management also seems more likely to reinforce conventional standards than to promote innovation.

- *Uncertain benefits.*
  Property values are currently driven by location, appearance and features, not delivered performance in use. Value to a developer often means finding a good tenant or selling on at a good price. What adds value for users is not valued in the marketplace.

- *Too threatening.*
  For every winner, there will be a whole lot of losers. Better not to know! Will the client look silly? Will they reach for their lawyers? Will insurers block the investigations? Will the book value of the building - or, worse still, a whole raft of similar buildings - suffer?

- *Not fully engaged with building design, procurement and management.*
  Cooper (2001) has already discussed the failure of RIBA's efforts to make systematic feedback a part of standard architectural procedures. At the same time, academic criteria drove pioneers in the universities into specialisms, but which often had less direct relevance to mainstream practice.

- *Lack of interest.*
  To the consternation of many a building researcher, the performance of a building is not of great interest to many occupiers. They do not regard it as a key business driver, in spite of its clear relationship with efficiency and productivity. For most, it is at best a passing interest.

- *Unclear "ownership".*
  Cooper (2001) suggests we need to unravel the separate but connected issues for briefing, design, management and benchmarking. For example, for design teams, he wonders if assessments would be more effective at the start of a new project. However, in addition to the experience of others, there is value in learning from more recent projects of one's own: the connections are more relevant and more immediate.

- *Professions which cannot agree where the public interest lies.*
  In spite of getting their professional status by agreeing to protect the public interest, professions like architecture, facilities management and building services engineering rarely get together to act cooperatively. POE is ideal for inter-professional liaison, but it hasn't happened much yet.

The client organisations which seem to be keenest to undertake feedback are usually the better managed ones, which realise that nobody's perfect. They know feedback is not about blame and defects, but learning from performance as experienced by the user, allowing everyone to review how they have done and where they can improve.

POE OR FEEDBACK?

Preiser asks if POE sounds too much like post-mortem. In the UK the term does seem to be a deterrent - words like "feedback" appear more acceptable, and better describe Preiser's triad of POE, data management and briefing/programming. Feedback was also the term used by the RIBA in 1963 to describe the final stage of its Plan of Work for design team operation. "Probe" - although gathering ground - probably sounds too much like a judicial review.

Feedback from completed projects can be of three main types:

1 *Review of project performance.*
A wide range of topics can be discussed: brief, design, project management, programming and coordination, cost control, build quality and so on.

2 *Feedback during the year or so after completion.*
In particular this can help to fine-tune the project, inform the client, design and building team, and ease the transition into full and effective operation.

3 *Assessing the completed product and its performance in use.*
The traditional role of POE.

Feedback can improve all aspects of sustainability's "triple bottom line":

- *Economic,* by showing where value has been added, where improvement is possible, where waste can be avoided, and what business and other benefits the users enjoy.

- *Social,* by taking into account the attitudes of the users and the wider community, and the effects on their well-being.

- *Environmental,* by assessing achieved performance, comparing it with appropriate benchmarks, and helping to close the gaps between aspiration and actuality.

SUGARING THE PILL

The Probe studies appear to be at the limit of what most clients would regard as affordable. It would be nice to do more, but unless the processes become more efficient or the budgets more generous, this may well need to be at the expense of something else. Can the costs of POE be brought down - or at least made more palatable? In our proposal for a feedback system for Construction Clients[21], we suggested an incremental approach:

- LEVEL 1. Simple ways to get initial results at low cost, e.g. walk-rounds and round-table seminars to review the product, its procurement, and its performance in use[22].

- LEVEL 2. Quick, robust, general purpose methods of quantitative assessment[23].

- LEVEL 3. More specialised techniques, sometimes with instrumented monitoring.

This maps closely onto Preiser's three levels of cost - for indicative, investigative and diagnostic surveys; but on a modular rather than a packaged basis. Clients inexperienced in POE may wish to undertake a Level 1 assessment before deciding whether or not to select modules from the higher levels. Experienced clients who know what they need may routinely apply a package of techniques selected from the modules available at each level, supplemented perhaps by modules of their own.

21 Project proposal to the UK Department of Trade and Industry under the Partners in Innovation programme by William Bordass Associates for the Confederation of Construction Clients, January 2001. This project is now funded.

22 A technique has already been developed and tested by the Higher Education Design Quality Forum for the Higher Education Funding Council for England, who are now considering post-occupancy assessment of all major projects.

23 e.g. the occupant questionnaire and energy assessment techniques used in Probe. These not only collect data for comparison with benchmarks, but also give deeper understanding of technical performance and occupant satisfaction.

EDUCATION AND TRAINING

Not only do clients need educating, but also assessors. Where will they come from? Preiser has trained many architects in POE as part of their degree studies - and warns architects of yet another group of professionals about to chip away at their territory. But are architects best-equipped to do it? Our experience in the UK is that architects like the idea of POE, but most do not undertake or even commission it. Probe team member Building Use Studies Ltd was set up by a group of architectural firms, but its commissions are from clients, users, project managers, or research and government clients - only four in 20 years have been from architects. As Derbyshire (2001) also discovered at the sharp end, one also has to ask whether this sort of work goes happily with mainstream practice. Maybe the assessor needs to be the referee in the Means and Ends dialogue we advocate (Bordass et al, 2001), see figure 2: advising the client and design team, but not forming part of the supply side. Certainly, Probe team members have personally found that it is in such roles that the messages are most likely to result in positive action[24].

Roberts' commentary

Roberts (2001) confirms the Probe team's experience that in spite of growing interest in POE, there is more talk than action[25]. With most clients' low rates of procurement, he wonders what scope there really is for learning opportunities, and whether there is a true audience for Probe's feedback.

The authors think feedback can lead to virtuous circles of improvement in many areas. It not only helps commissioning clients to improve their briefs, requirements and procedures, but also allows:

- Design and building teams and their suppliers to apply their skills more effectively.
- New buildings and building alterations to be better fine-tuned.
- Occupiers to improve their understanding of user requirements and the effectiveness of their facilities management procedures.
- Improvements, guidance and regulations generally to be more precisely targeted.

Probe was first aimed at the building services design engineer, but has been widening its targets. The papers in the BRI special issue were part of this process. Many of the findings have proved to be generic, so there are major opportunities for everyone to learn from the experience of others.

The Probe team is made up of people from several consultancies, which themselves each provide feedback services to individual clients to assist their business process improvement. However, Probe itself has been a public domain activity, more concerned with generalities than specifics, and with a focus on what designers - and principally engineers - can reasonably do to help create better-performing buildings.

The clearest advantage is probably for the multi-building occupier who is also a serial client. Some of these (e.g. retail chains) already have well-established feedback systems - though routines can go stale and need regular review and refreshment as times change and new issues emerge. Others are trying to use feedback to improve the service they get. For example, Cambridge University is promoting "soft landings" contracts, in which the design and building team do not immediately withdraw once the building is complete, but remain involved to help fine-tune the systems and inform and learn from the client and the occupier.

---

24 Particularly where the assessor's contract continues from briefing/programming through design and construction and into the first two years of occupancy.

25 The authors are getting tired of sitting in or hearing about meetings of people who pontificate about POEs but have never been involved in one!

Some of the general findings from Probe are more difficult to act upon, because they have systemic implications and are not easily carried through by a single player. Nevertheless, they can help - and may already have been helping - to assist culture change. For example, Roberts thinks that Probe's findings on control systems are of limited value to the end user. We disagree. Control systems often fall short in usability not for a lack of engineering skill, but low expectations. We find the really good ones have usually been procured with strong client involvement - so the most effective drivers of improvement may well be clients who demand better systems and are prepared to consider what this means; and to pay for things that really add value for the user.

Similarly, by reference to known buildings, Probe's findings on airtightness - although merely reinforcing studies already undertaken by research associations - brought home that the same problems could occur in even the best-regarded new buildings, previously thought to have been somehow immune ("it couldn't happen to us"). In the UK this helped to pave the way to a campaign by the president of the Chartered Institute of Building Services Engineers, and to changes in the Building Regulations. Probe was just "one brick in the wall", but it helped. The impetus for other proposed changes to the 2002 Building Regulations - energy meters and targets, better commissioning, better lighting controls, log books, MoTs and so on - has also been, at least in part, a consequence of Probe's published findings. These measures also begin to put in place the vocabulary and infrastructure for greater transparency between client and design requirements and achieved performance, and may even pave the way to performance guarantees by the design and building team.

CLIENT OR INDUSTRY-LED?

Should clients be driving the industry (as Derbyshire (2001) proposes) or should the industry be driving itself (which Roberts much prefers, as do Sizgeti and Davis (2002))? For us the answer is a bit of both. While clients for mass-market products can decide what to buy, the property market is different. At any time there is limited choice. Standards are set by suppliers, producers, agents and investors which historically have only understood market demand at a fairly superficial level, are suspicious of change, and tend to drive in the rear-view mirror in order to protect their existing assets. They are not in the habit of studying the performance of their completed products; consequently, they tend to regard everything as a success - unless it was a conspicuous failure. This makes continuous improvement difficult and helps to explain why some of the low-level problems identified by Probe are so persistent. Paradoxically, the march of fashion can also mean that older buildings which actually perform reasonably well for their occupants also become regarded as failures and are needlessly demolished.

Can this market respond to the triple-bottom-line demands of the 21st century without strong client drive? Our project experience leads us to think not. The market contains so much inertia, and is so unaware of what is really required of it[26] that without strong client leadership, we fear that the pioneers will lose out to their price-driven competitors. Regulation can help, but time and again what was intended to be a minimum standard turns into the industry norm. Often the products do not even perform at the level the standard anticipated; while products which truly perform to the right standard are expensive and difficult to find.

Can the industry get together to establish a mechanism to drive standards forward, based on a through appreciation of achieved performance? Not without a massive amount of commitment, education and coordination. We need to close the loop in an equitable way in order to clear this log jam. POEs are but precursors to this remedial action. They need to be carried out in a spirit of learning and openness, not as part of the "blame culture". Otherwise the "Emperor's New Clothes" syndrome will continue. Nobody wants to sign their own death warrant!

Szigeti and Davis's commentary

Szigeti and Davis (2002) point out that few briefs/programmes include identified levels of demand and indicators of capability or performance that can be compared with the outcomes in the completed product. They refer to their tools (now developed into ASTM-ANSI standards) for rating what is required and what is provided, and comparing them. This approach - to present the results on an absolute scale and then to compare with a benchmark on the same scale - we much prefer to relative scales like "savings" or "performance in relation to design intent", which can make it impossible to know exactly what is going on and to compare data from one building with another. This is why we report the Probe energy and occupant survey data in the way we do.

26 With "essential features" being widely regarded as optional extras, as outlined in Bordass et al (2001).

Szigeti and Davis look forward to a closer mapping of the functionality and serviceability attributes which ASTM-ANSI quantifies, with the outcomes from Probe-like studies. We do too. The proposed feedback system for the UK Confederation of Construction Clients aims to explore these issues and to help provide a gateway to a range of robust and practical evaluation techniques.

As Szigeti and Davis say, performance-based building and feedback are hardly new ideas, but they are still not widespread in practice. Maybe this was because few people were sufficiently interested; techniques were not robust enough; or data was not available, or too expensive to get, to store and to manage. Effective data management is still a major obstacle to good outcomes. Often neglected in one-off studies, it then comes to a head from time to time in ambitious data collection and databasing exercises, which frequently fail to deliver.

DATA MANAGEMENT

By adopting robust, simple techniques for collecting both the energy and the occupant survey data from Probe and other projects, Probe team member companies have been able to build up information consistently over the past 15 years. This has allowed us to benchmark and compare the buildings we have studied[27], something which much other work has been unable to do because the metrics are constantly changing. Surprisingly, this aspect of the work - creating simple but effective strategies for data storage and benchmarking - has never been of interest to our funding agencies. But perhaps that is why we have had to find ways of doing it cheaply but effectively.

Cordy's commentary

INITIATIVE FATIGUE

Cordy (2002) describes the British local government system, and how - in common with many other UK public sector and non-governmental bodies - it has to cope with "initiative fatigue" in a society in which trust has been replaced with accountability; and politicians feel they have to be seen to be doing something - always changing the rules before the game has been played out. It makes one tired just to read about the number of forces to which a cash-strapped local authority is being subjected. It must need superhuman effort for people like Cordy to cope with them, let alone create strategies which can rise above them and get things done. If ever there was a vicious circle, this is it.

Heaving into view to join all this unmanageable complexity comes POE,which he sees as . "... an approach only marginal and theoretical in its benefits". Yet another contributor to the initiative fatigue and the funding gap! Cordy rightly asks what value it will add. Strategically, there is a simple answer "if you don't know what you are doing, don't be surprised if you don't get what you want".

WHO SHOULD TAKE OWNERSHIP OF POE?

But who are *you?* Cooper (2001) asks "who owns POE?". In our view, feedback will become routine most quickly if it is promoted by clients as something they want done - and will pay for, as they know it will bring benefits and savings. But feedback needs to become a routine part of normal practice, not an added drudge. As the philosopher Whitehead said "civilisation advances by extending the number of important operations which we can perform without thinking about them".

Although clients may best own the initiative of getting feedback started, they need not own all the consequences of their decision. All the players involved should own the problems that are most appropriate to them. Probe has already identified some missing links at the strategic level (Bordass et al, 2001). For example, for the different players:

- Commissioning clients: manageability needs to be a clear briefing objective.
- Designers and builders: get the essential features right - they are not optional extras.
- Project managers: manage the brief. Make sure the means suit the ends.

27 Data management for the occupant survey is the most rigorous, because Building Use Studies Ltd. is in full control of the survey questionnaire tool. This in turn permits highly automated processing, comparisons within and between buildings and populations, and report writing. For the energy survey, all buildings are different, so a totally consistent description is impossible: instead one has to collect the information from wherever one happens to find it.

- User clients: insist on “sea trials” periods where you get together with the design and building team - so you can understand what they have provided, they can understand what you need, and you can both learn and improve performance - now and in the future.

- Government: use the feedback stream to monitor progress and develop policy.

As the Probe reports make clear, buildings - even new ones - are often laden with value needlessly subtracted, and frequently lack simple features which would make them more robust, more comfortable, more adaptable, more manageable, more usable and more sustainable. At the same time, other features are found to be delivering at best marginal benefits, and could sometimes be helpfully omitted - saving money to spend on the essentials. In responding all the other initiatives, have we ceased to focus on what is right under our noses?

THE DIFFICULTIES OF GETTING STARTED

Unfortunately, overloaded public sector organisations can find it difficult to get started, even if they really want to. For example, one asked us to help improve the procurement of a new building by incorporating feedback from buildings we had studied. We jumped at the chance, but then came the problems:

- Standard procedural requirements (which presupposed conventional client - design and building team relationships) did not readily allow the client to appoint us in an advisory role. They wanted us to be part of the project delivery team, while we felt it important to focus on their ends as a client - what they wanted to get from the building and what they would pay for.

- We need not have worried. The client was so busy meeting all the procedural requirements - including initiative overload - that they could not spare the time to focus on their ends anyway. Given this kind of situation, one can see why the commonsense gap identified by Fisk (2001) occurs, and clients let bad things happen which appear self-evident in hindsight.

- As part of the selection procedure for the job, the design and building team had committed themselves to timescales, cost levels and principles of building design and appearance which were questionable in the light of feedback experience ... but the die was already cast!

The solution is as an advisor to the client team, with early involvement at a strategic level before any commitments have been made, plus follow-through with a light touch after that.

DON’T OUTSOURCE YOUR FEEDBACK LOOPS!

In common with many organisations - it seems - local government is having to pull back from the ownership of facilities and the direct delivery of services, and become concerned with enablement, facilitation, liaison and monitoring. With a flattened and downsized bureaucratic pyramid, is there anybody left to do the work? No: it is increasingly outsourced.

But does outsourcing in buildings always deliver benefits? Here is an anecdote. We did a survey of a county museum and record office. The caretaker looked after the building. He knew everybody, coordinated the cleaners and suppliers, dealt with minor repairs, and alerted the management to bigger problems. In addition, he could be trusted meticulously to supervise the loading and unloading of priceless objects. He also chased away boys who threw stones at the windows (it is a modern, over-glazed building); and if they came back he found out who they were.

Then came Compulsory Competitive Tendering (CCT), to which Cordy refers. Out went the caretaker, in came a security firm. The security staff sit at the front desk and do the patrols. But:

- Do they understand the work of the museum? No.
- Do they keep the boys away? No, they phone the police.
- Can they be trusted to supervise the deliveries? No, the curator himself now has to do it.

The service that the caretaker provided was not just security, he was a trusted and valued part of the team. He took far greater responsibility than was explicit in his salary level and stopped many problems ever coming to the attention to the management, let alone having to be programmed, facilitated, tendered and monitored. And what of minor repairs? Well, the maintenance contractor for the main engineering plant has an impressive "planned preventative maintenance" programme, but nobody supervises their work and minor problems (dripping taps etc.) are now nobody's problem until they become more acute. Other aspects of the feedback loop have also been broken - if something goes wrong and there is a call-out, somebody - anybody - rushes to site in a van and treats the symptoms without understanding the underlying causes, let alone contributing to the knowledge base of the building occupiers or the local authority. How sustainable is that?

"Don't outsource your feedback loops", we say from our experience; otherwise you can get the type of problems outlined above. However, organisational procedures now often want to outsource property entirely. For example, both we (Bordass et al (2001)) and Cordy mention the government-supported Private Finance Initiative (PFI). Essentially this wants clients not to procure buildings (and incur capital expenditure) but instead procure serviced space which the providers will finance, design, build and operate, rolling all the costs into an annual service charge. With this approach, the public sector customers hope to outsource their risks onto the private sector service providers who - of course - are expected to be experts in the procurement and management of buildings. From our perspective, we fear the following problems:

- Occupier requirements are not static, but the contracts frequently assume that client needs will not change. When they do, there could be punitive costs.
- Consequences are not clear, because historically the feedback systems have been so weak. Property providers are not - or not yet - the experts that the administrators might like to think.
- Total costs are likely to be higher than the traditional model. In theory, they provide better value - but will this be affordable, particularly as sustainability requirements loom larger?
- The service providers tend to be more concerned to lay off risks than to manage them: if there are downsides, the risks will ultimately end up where they started, with the taxpayer.

We desperately need that feedback!

Moving forward

As authors and promoters of feedback from buildings, how do we react to the feedback to our own five papers in BRI, both in the Special Issue itself and the current batch of commentaries? We are:

- Delighted that so many experts took the time to read and reflect on our papers.
- Reassured that we have been making a useful contribution.
- Encouraged that some of the messages ring true around the world.
- Inspired by what seems to be a convergence of many trains of thought and activity.
- Eager to continue with further development and implementation.

Most of all, by widening the context, we think the commentaries will move the topical debate on POE forward substantially - both in the UK and internationally. This will help clients, researchers, government and the supply side of the industry to work together to implement POE and feedback on a much larger scale. In turn, this feedback will help to drive the major improvements in all-round building performance which are essential to meet the sustainability challenge which faces us all.

In the introduction, we mentioned what we call the Age of Consequences. As environmental externalities, infrastructure constraints and congestion costs become more dominant and Information and Communications Technology makes it easier to manage feedback information, relationships between cause and effect will become clearer. Building design itself is becoming less important than the total system of interconnection. For example, obsession with minimising space costs can increase personal, economic and environmental costs of transport. In some buildings recently surveyed, we have found that people spend, on average, a total of over two hours a day commuting.

Some consequences arising from the Probe studies are becoming clearer, too. Sometimes POEs seem like the tyranny of small decisions - they can't see the wood for the trees. However, one consequence of what we do is to show that strategic aspects are important and need to be developed. But detail is important as well: the supply side has ways of identifying and dealing with potentially catastrophic problems, but has tended to ignore (and sometimes even to create) low-level chronic ones - with major negative consequences for people and the environment. By dealing with the simple questions to which many of the answers are already known, one could well halve the energy consumption of new buildings and increase the productivity of the occupants by 5%.

We need to face up to the consequences and use strategy, feedback and attention to detail to change from vicious to virtuous circles. Buildings are connected into behavioural, organisational and subregional systems, but the design professions often think they can design their way out of trouble. As Fisk (2001) observes, they also seem to favour novelty over innovation and consolidation. One problem in procurement is "going spatial" too early, before strategies are clearly determined and their likely implications understood. Perhaps the worst example of this is design competitions: these should be used to select a team, not a building.

In terms of building type, we have noted:

- The *intensification* of many buildings, with more equipment, greater space productivity, and longer hours of operation; and requiring high levels of management and support services - ideally the Type A buildings in figure 1.
- This intensification activity can lead people to think that soon all buildings will be like this.
- But intensification is just one part of a larger system. It is inextricably connected to its companion, *diversification,* as when intensified office "hubs" support people also who also spend some of their time in dispersed locations. Some may be intensified too (e.g. hotels) but many are simpler.
- If intensified buildings are just the tip of the iceberg, many uses may go best in highly robust, adaptable, environmentally benign buildings: ideally Type Bs in our parlance.

We also think that the public sector in particular would often be better served with simpler buildings - at least where this makes sense in terms of the briefing/ programming requirements. This sector already finds its buildings difficult to maintain and manage (our Type Cs). Initiative fatigue and a crisis in procurement and management has led it to hope for someone else to resolve its problems by some kind of magic, using mechanisms like PFI. But this appears to produce Type A solutions - putting public facilities into what amounts to hotels. The theory is that this will help to avoid the neglect which has occurred in the past; but in practice will the hotel bills be sustainably affordable by the taxpayer? Or are we exporting problems - and more Type C buildings - to the next generation?

In future we think buildings will split into two main types: intensively used, highly technical and highly managed; and simple, robust, adaptable, and largely self managing. As Stuart Brand (1994) discussed, high-road and low-road buildings both have their roles, while "no road" buildings too often win the competitions!

REFERENCES

Baird, G. (2001) Post-occupancy Evaluation and Probe: A New Zealand Perspective *Building Research and Information,* **29** (6), pp XX-XX

Bordass, W., Leaman, A. and Ruyssevelt, P. (2001) Assessing building performance in use 5: Conclusions and implications. *Building Research and Information,* **29** (2), 144-157 (March-April).

Bordass, W (2001a) *Flying Blind: Fifty things you wanted to know about energy in commercial buildings but were afraid to ask,* paper for the Oxfordshire Energy Advice Centre, to be published by the Association for the Conservation of Energy, London (in press).

Brand, S. (1994) *How Buildings Learn* New York: Viking Penguin.

Cohen, R., Standeven, M., Bordass, W. and Leaman, A. (2001) Assessing building performance in use 1: The Probe process, *Building Research and Information,* **29** (2), 85-102 (March-April).

Cooper, I. (2001) Post-occupancy evaluation - where are you? *Building Research and Information,* **29** (2), 158-163.

Cordy, P. (2002) Post-occupancy evaluation in the local government context in England - a client perspective *Building Research and Information,* **30** (1), pp XX-XX

Derbyshire, A. (2001) Probe in the UK context. *Building Research and Information* **29** (2), 79-84.

Eley, J. (2001) How do post-occupancy evaluation and the facilities manager meet?, *Building Research and Information,* **29** (2), 164-167.

Fisk, D. (2001) Sustainable Development and Post-occupancy Evaluation *Building Research and Information,* **29** (6), pp XX-XX

Markus, T. (2001) Does the building industry suffer from collective amnesia? *Building Research and Information,* **29** (6), pp XX-XX

Preiser, W. (2001) Feedback, feedforward and control: post-occupancy evaluation to the rescue. *Building Research and Information,* **29** (6), pp XX-XX

Roberts, P. (2001) Who is Post-occupancy Evaluation for? *Building Research and Information,* **29** (6), pp XX-XX

Szigeti, F. and Davis, G. (2002) The turning point for linking briefing and POE? *Building Research and Information,***30** (1), pp XX-XX

Whyte, J. and Gann, D. (2001) Closing the loop between design and use: Post-occupancy Evaluation *Building Research and Information,* **29** (6), pp XX-XX

Zimmerman, A. and Martin, M. (2001) Post-occupancy evaluation, benefits and barriers *Building Research and Information,* **29** (2), 168-174 (March-April).

Probe reports, reviews and data are freely available through www.usablebuildings.co.uk

Figure 1 Building types

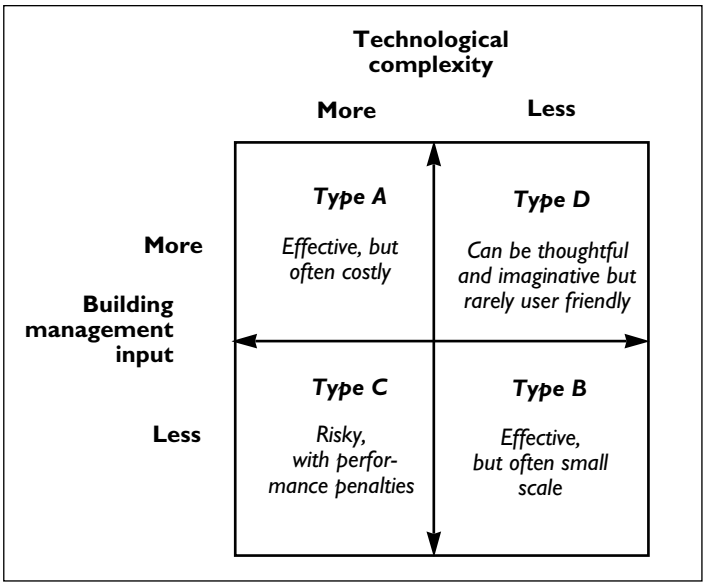

Figure 2 Ends, means and feedback with nine Probe pointers