LEARNING MORE FROM WHAT WE BUILD
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1   Introduction and summary

This chapter is based on an initial review undertaken by William Bordass Associates in 2002, in preparation for a project to improve feedback by construction clients and the industry in the UK. The review included a literature survey, a client questionnaire, and a series of workshops. The project was initiated by the Confederation of Construction Clients and is sponsored by the UK Department of Trade and Industry under its Partners in Innovation programme. However, the views expressed are those of the author.

The main outputs from the project will be:
•   A Feedback Portfolio, providing access to a range of feedback techniques and results. A prototype will be available on www.usablebuildings.co.uk from April 2003, tuned-up in trials during the rest of 2003, and formally launched in early 2004.
•   A committed group of users of the Feedback Portfolio.
•   A strategy for further development after the current funding ends in April 2004.

There is clearly a perceived need for more feedback and not just in the UK. A review by the Federal Facilities Council in the USA [1] presents a very similar picture and we have also had support from Canada, Australasia, and the Netherlands. Partly this seems to be because international trends have caused senior management to focus on core business, to outsource facilities expertise, and then to discover that facilities were more important to the business mission than they had thought. Organisations are now seeking to replace their lost expertise through post-project evaluation and making the supply side more accountable for performance delivery.

In spite of this, resources for feedback are still thin on the ground. Many clients don't see why they should pay. Nor, for the most part, do designers and builders, who also fear uncovering problems for which they may then be held responsible, at best giving them more (probably unpaid) work to do and at worst landing them in court and uninsurable. In addition, the hope that PFI[1] procurement would magically close the feedback loop has so far proved forlorn - PFI teams need feedback tools too.

In order to make feedback routine, there is a strong case for making a commitment to feedback (during briefing, design, construction and for at least a year afterwards) a contractual requirement; and for the processes and services to be defined and paid for accordingly. Proposals for project insurance may make this easier, as may a widespread demand for feedback services.

In our discussions and in some papers reviewed, there have also been pleas to regard feedback as much broader than the design and construction project - i.e. across a portfolio and from cradle to grave. Many clients are also particularly interested in looking at the full range of business benefits, and less concerned with the building-related ingredients such as occupant satisfaction and technical and environmental performance. While we appreciate these arguments, they do not fit well with the actuality of the scarce funds for feedback and the widespread ignorance of even the simplest issues. We fear that the best may be the enemy of the good; and that a more effective way to entrench feedback may be to find enthusiastic partners with whom one can demonstrate modest but robust successes, which then trigger virtuous circles in performance-driven organisations.

Regarding feedback techniques, there was a call for more clarity on the techniques available, how to get hold of them, how much they cost, and the benefits they were likely to deliver. Here the proposed Feedback Portfolio will help, and this will also include examples of successful and cost-effective outcomes. We have identified four principal kinds of technique. These can be used separately or together - many people got the best results from combining hard and soft issues.
•   Observations
•   Questionnaires and interviews
•   Facilitated discussions
•   Physical monitoring, testing, and analysis of performance statistics.

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[1]   The UK Government's Private Finance Initiative, in which public works are financed, designed, built and operated by the private sector.

2   Some history

THE BUILDING PERFORMANCE RESEARCH UNIT
Following a major review of architectural practice, in 1963 the RIBA (The Royal Institute of British Architects) published its Plan of Work for design team operation, which included Stage M - feedback. Later in the decade, twenty architectural and engineering practices, the RIBA, the Architects' Journal and the Ministry of Public Building and Works sponsored the Building Performance Research Unit (BPRU) to undertake feedback, bring together research, teaching and design on building performance, and publish the results.

BPRU only lasted four years in this form. Its work was largely on comprehensive schools. The results were published in 1972 in the book *Building Performance* [4]. While today the book strikes us as rather theoretical, its practical findings still ring true, for example an obsession with first cost, repeated mistakes (e.g. untreated timber windows failing and being replaced by the identical product), poor strategic fits between buildings and what goes on inside them (e.g. classroom sizes), and single-issues (e.g. daylight factors) dominating the design, preventing effective integration (and the required daylight factors were not achieved anyway!).

The book included a plea for architects to be more involved in feedback. Ironically, in the year it was published (1972), the RIBA omitted Stage M from its publication on Architects Appointment, reportedly because clients were not prepared to pay for feedback as an additional service; and the RIBA did not wish to create the impression that feedback would be undertaken as a matter of course. Today the wheel seems to have turned full circle, with the RIBA saying in [6] that *"the biggest improvement to be made [in customer focus] is in systemising feedback and in instituting post-occupancy evaluation"*. However, Stage M is not yet back in their standard published documents [15].

WHY DID BPRU NOT FLOURISH?
A statement in the book may provide the key: *"BPRU was more interested in research than in developing devices, however practical, without a sound theoretical framework"*.   To wish to develop theory at the expense of practical opportunities for improvement may fit the priorities of academe, but (as discussed by Cooper [7]) might well have distanced BPRU from the designers, clients, operators and users they had intended to serve.

3   Highlights from some recent reviews

CRISP 1. HOW CAN LONG-TERM BUILDING PERFORMANCE BE BUILT IN? [8]
This study of flexibility and adaptability in buildings for the Construction Research and Innovation Strategy Panel has important implications for feedback. In particular, it points out that:
- The relationship between occupiers and buildings is constantly changing.
- There are often clashes between operational requirements and physical facilities[2].
- Designers seldom get feedback after a building is completed and *only notice problems when they are asked to investigate a failure.* This tallies with our own experience, and allows the same problems to persist in building after building. In addition, since outcomes are not routinely assessed, simple, effective solutions are often not appreciated for the successes they are[3]; and over-complex alternatives are instead developed unnecessarily.

The study found that there was far too little feedback of in-use experience into briefing and design. This could easily lead to poor fit between the physical building and the way in which the occupiers wanted to operate it. A lack of feedback information also meant that operational cost predictions did not relate to outcomes in practice. In addition, the amount of alteration that often took place in the first years of a building's life could make design assumptions on component lifetimes faulty.

A major recommendation of the study was for more Post-Occupancy Evaluation (POE), an investigation of the opportunities and barriers to POE (which CRISP commissioned - see CRISP 3 below), better dissemination of information on building performance, and a review of the degree to which the feedback results already available actually reached decision-makers.

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2   For example, in a hospital where designers had provided demountable ceilings for "flexibility", the ceilings could not be demounted owing to concerns about infection control.
3   For example, research by the Medical Architecture Research Unit, quoted in [8], indicated that Nightingale hospital wards had proved more efficient in healthcare than many new alternative layouts introduced in the past 30 years.

CRISP 2. MATCHING DESIGN ASSUMPTIONS AND CONDITIONS IN USE [9]
This study looked at how design assumptions are made, how conditions in use affect them, and how the situation could be improved. It concluded that:
- Occupants' knowledge is not being adequately used to inform designers.
- Building services installations are some of the least understood aspects, as illustrated by their taking the top three slots in the survey for both of over- and under-specification.
- Performance measurement is not an exact science, making benchmarking difficult. Feedback is essential for benchmarking.
- Very few POEs are undertaken. For those that are, the information usually stays within the client and consultant group[4].
- There is a perceived need for a 'keeper of information' of good and bad examples of buildings and processes.
- Facilities Managers (FMs) are usually treated as caretakers and not involved in briefing; there was also no home for any feedback FMs had, and no system to take their experience back to designers.

The report identified a feedback vacuum, with few linkages to those who actually ran buildings.

CRISP 3. ENCOURAGING POST OCCUPANCY EVALUATION [10]
This report looked at ways of making POE more routine and overcoming barriers, e.g:
- Unwillingness by clients to pay for POE - especially occasional clients, who saw the main benefits going to the design team and their next client.
- No POE in standard conditions of engagement for designers. Architects did at least have it as an option. However, there was no clear guidance on what service should be provided; and a standard text [12] regarded it as being more about process than product or performance.
- A lack of clarity generally on what should be done, who should do it, what it should cost, and what the demonstrable benefits were.
- Widespread concerns by designers about insurance and liability issues, though these seemed more theoretical than actual. Most clients regarded legal action as the last resort, and much preferred to keep lines of communication open. POE was likely to help this to happen.

Various technical ways of removing the insurance barriers were explored.

On the rare occasions on which POEs were done, they were usually in the first year of occupation, most often on staff or client satisfaction. They could be undertaken by in-house teams, outside organisations, or both. Occasionally they were planned from the outset of a project. They might even become part of team appointments - as is being proposed for UK government clients.

Benefits of POE were seen to accrue to:
- The client, in demonstrating achievement, understanding areas of success and failure, facilitating any remedial action, and demonstrating concern for users.
- The designers, in helping to fine-tune the building and inform future designs.
- FMs, in helping them to identify and solve problems, and to understand the potential of the building and how to run it better.
- In the longer term, better and more cost-effective buildings all round.

The report proposed that the following measures could improve the uptake of POE:
- A clarified insurance situation. Perhaps the simplest way would be to make POE routine, so there would be no unusual risks in doing it.
- For clients to be encouraged to regard POE as a service worth paying for (or doing themselves). This would need clearer demonstration of costs and benefits.
- To define more clearly the techniques available and the associated levels of service and cost, perhaps with endorsement by institutions and trade bodies.

The current project will be helping with the second and third of these.

Recommendations to CRISP included:
- A website with accredited case studies[5].
- A cross-party forum for clients, designers, insurers and contractual bodies.
- Defining client requirements for POE service packages.
- Investigating whether it would be practical to tighten building briefs to concentrate on expected performance, together with the appropriate testing mechanisms.

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4   An exception is Probe - a series of 20 POEs published between 1995 and 2002. This also gives priority to building services and environmental performance.

5   Some of these are already on www.usablebuildings.co.uk

THE US EXPERIENCE

North America has long experience of POE. While some Federal agencies do it routinely, in 1987 a federal committee identified widespread lack of institutional support. The committee recommended:
- making POE more rigorous and systematic;
- laying the groundwork for a database on building use and performance; and
- establishing a clearinghouse to assemble, maintain and disseminate POE information.

In practice, not much seems to have happened since, so in 2001 FFC - the Federal Facilities Council - reviewed the situation and published their findings in reference [1]. See also reference [16].

Why this new interest? The preface suggests it was the result of the management trend to focus and downsize organisations and to outsource services:
- On the upside, this focus has caused Boards to see buildings as ways to achieve strategic goals: customer satisfaction, innovation, time to market, worker retention & productivity.
- The downside is that Boards have downsized their in-house buildings expertise, outsourced essential feedback loops, and lost the capability to deliver!

Lost in-house knowledge, often tacit and informal, needs to be replaced. POE is being asked to fill the gap; and to go beyond user satisfaction to all activities which affect how a building performs. POE is no longer an option, but essential to regain lost skills and stop customers becoming victims of a supply side which does not understand their real needs or how its products really work in use.

The FFC sought:
1   *A standard definition of POE and a standardised, consistent methodology to be used across agencies.* The review found that this was neither necessary nor desirable.
2   *Methods and technologies of data collection.* Information technology was seen as the key - perhaps too much so in our opinion. You learn a lot on a site visit.
3   *Costs.* Quoted costs ranged from US $ 1,800 for a simple questionnaire to $ 90,000 ($ 2.50 a square foot) for an in-depth exercise.
4   *Benefits.* These included support of policy development; testing new concepts; improving standards and design guides; getting lessons back to the supply side; making designers and owners accountable for building performance; supporting major decisions and avoiding past mistakes; monitoring quality and functionality; improving performance over the lifecycle; and involving occupants actively in evaluation and improvement.
5   *Organisational barriers.*   Few organisations did POE: they had not created conditions for learning, organisational structures got in the way, they were unclear about the benefits and fearful of staff reactions if problems were exposed and not put right. Without senior commitment, they were reluctant to appoint outsiders; and government agencies could not find time and money for new things anyway! POE can also expose failure, which is not rewarded - either in-house or by politicians, journalists and auditors. This fear (and the lack of systems) meant that information stayed within the project. These issues are very similar to those raised in the UK reviews and in our recent discussions with clients.
6   *Performance metrics for POE programmes.* In an appendix, Heerwagen advocates a "balanced scorecard" to help avoid myopia, particularly financial. It has four aspects:
- financial, e.g. reducing costs, increasing revenue, improving productivity;
- business process, improving workflow and outcomes the organisation values
- customer relations, e.g presenting a more positive face to the world;
- human resource development.

She recommends establishing metrics at the start of a project and tracking them through. Some may apply to all an organisation's stock, others may be highly context-specific.

Successful programmes were usually linked to some sort of business driver, for example:
- When facilities seemed to be putting off customers (e.g US Army and Post Office).
- When facilities were critical to the business mission (e.g. Disney Corporation).
- Where specific linkages to briefing and evaluating innovations had been made.
- For fine tuning asset management and space planning (e.g. Bell Canada and World Bank).

Where POEs were undertaken, they was almost always in the first year or operation (though Disney also does continuous assessment). Once the initial purpose had been achieved, some exercises were scaled-back, either to save money or because the organisation had learnt what mattered[6]. For example, the US Post Office used to commission professional surveys, but now uses a self-completion questionnaire for the manager of a new facility. US embassies also make use of questionnaires before deciding which experts they need to send out for any detailed investigation.

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6   However, time moves on, so techniques based on yesterday's priorities must also be alert to emerging new issues.

For a successful POE programme, organisations were encouraged to:
- Take the initiative to collect the information, make time to make sense of it, and have the will to share it[7].
- Have long term management commitment to signal the importance of the exercise.
- Create broad opportunities and incentives for participation and reflection.
- Identify critical stages where feedback can be built in.
- Require involvement in POE in contracts and prequalification for suppliers.
- Provide simple databases, cross-links, and different information for different audiences.
- Build on projects where there are complaints or controversy, to avoid repetition.
- Do POE on innovative buildings to decide whether to continue with the innovations.
- Start by creating protected, small scale opportunities for innovation and evaluation.

A successful POE itself was thought to require:
- A clear statement of what the organisation wants to achieve and the part evaluation plays.
- To match the resources for data collection and analysis to the available time and budget[8].
- To decide if it was a one-shot case study (which may need to be thorough to have an impact), or a standard approach which could build up information more slowly over time (but would need clear and consistent terminology, definitions and documentation to assist comparisons).
- Identification of the likely users and how they will need the results communicated.
- A mixture of qualitative and quantitative, direct and indirect techniques.

If questionnaires were used, they must be designed by a skilled person, with items evaluated for usefulness, validity, discrimination and balance. Occupants must be told why it was happening, how the results would be used, if they would get them; and if so, what for and how much detail.

PROBE - POST-OCCUPANCY REVIEW OF BUILDINGS AND THEIR ENGINEERING

This unique series of twenty published post-occupancy surveys ran in *Building Services, the CIBSE Journal* from 1995 to 2002. A special issue of *Building Research & Information [11]*, includes five papers on the method and conclusions. These in turn led to commentaries from experts around the world, and a response by the authors [14].

Probe shows that it is possible to put feedback information on named buildings into the public domain. Its principal tools of an occupant questionnaire and an energy survey provided benchmark comparisons and rapidly unwrapped into other issues, e.g. briefing, procurement, build quality and business and facilities management.

Probe itself was oriented at extracting general messages for designers and their clients, rather than specifically feeding back to the building itself and the teams concerned[9]. Organisations already operating monitoring and feedback systems used the Probe results to make further improvements, but those that weren't didn't necessarily react. Cultural change and incorporating feedback within routine design, construction, procurement and management practices are therefore important.

A major conclusion was that feedback would help to add value without increasing cost, by linking more closely the means (the constructed facility) to the client's ends, and so stopping the project itself becoming the end and so losing touch with fundamental requirements. In addition:
- Clients should define their ends more clearly and undertake monitoring and reality-checks.
- Designers should seek to understand more about how buildings really work and make them better, more robust, more useable and more manageable.
- The supply side should establish "no surprises" standards and provide support after handover, for example with provision for "sea trials" periods in standard contracts, with much better proving of system performance and provision of aftercare to clients and occupants.
- FMs should monitor, be more responsive, and represent client requirements more strongly.
- Professional institutions should encourage feedback as part of normal practice.
- Government should encourage feedback and measures which lead to all-round improvement.

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7   Interestingly, even Disney did not have an integrated knowledge management database, but three separate specialist systems. Much dissemination was by personal involvement, with the engineers who were particularly involved in feedback acting as information carriers and being invited by teams to attend their meetings to inject their experience.

8   Iterative techniques can also useful here. For example, for overseas building operations, the US Department of State first sends out a postal questionnaire to identify the occupants' views and concerns before deciding the professional membership of the team who will go to survey the building. The CIBSE TM 22 energy survey used in the UK Probe studies is also iterative, so a small amount of effort already gets a useful result, which can then be improved if everybody agrees it is worth doing so.

9   Clients do commission Probe-type surveys too, but as a rule the results of these are used internally and not published.

4   Types of feedback technique

FROM FEEDBACK TO KNOWLEDGE MANAGEMENT
There are perhaps five levels to implementing feedback systems:

1   The will to do it, particularly at senior level.
2A   Tools to help gather information on individual projects.
2B   Tools to help people (clients, designers, users ...) get together to discuss how a project went in a constructive way, to consider any data generated by 2A, and to learn from it[10].
3   Means of turning the results of 2A and 2B into useful, actionable knowledge, starting with the parties concerned (e.g. client, design & construction team, users, managers)[11].
4   Consolidating this knowledge into organisational learning, or so-called Knowledge Management (KM) in "learning organisations". In our discussions, clients (even leading ones) said that they were not yet good at this - a problem shared with most construction industry companies, and also confirmed in the North American review [1].
5   Bringing all this together into industry learning.

RELEVANCE TO THE CURRENT PROJECT
The project we are doing focuses on the nuts and bolts of data collection, i.e. Level 2 and particularly 2A. However, many clients thought that the main problem was not a lack of techniques but of the will to use them (Level 1). Levels 3, 4 and 5 are largely beyond the scope of the current project, but are covered in others and will where appropriate be added to the Feedback Portfolio.

FOUR PRINCIPAL TYPES OF TECHNIQUE FOR COLLECTING LEVEL 2 INFORMATION
We see four principal ways of collecting data, as outlined below. These can be used separately or together. There is widespread agreement that the most successful feedback exercises tend to combine both hard and soft issues, and both qualitative and quantitative methods.

TYPE 1 - Observation
Typically walk-through surveys, for example:
•   Experts from Hereford and Worcester County Council used to walk through their recently-completed projects and assess their impressions against a standard checklist.
•   The Probe surveys make good use of walk-throughs of all parts of a building including service areas and plant rooms. These permit not only visual observations but spot tests, and spot measurements with hand-held instruments. At the same time they create opportunities for informal discussions with staff - from which much of value can emerge.
Systematic observations can also be undertaken, for example of how customers use a facility, or how staff undertake their work or, say, operate a control device.

TYPE 2 - Facilitated discussions for teams, clients and others
General guidelines have been developed and tested in the "Learning from Experience" project [13] - not just to discuss the outcomes of a completed project *(hindsight reviews* in LFE's parlance), but during it *(insight reviews),* or before starting *(foresight reviews).* A format for post-project review workshops ("fora") has also been developed by de Montfort University for the Higher Education Design Quality Forum [3] and is now being applied in other sectors.

TYPE 3 - Questionnaires and interviews[12]
Many techniques are already in use and will be reviewed in the course of the project. Workshop discussion suggested that there was scope for coordinating some key survey questions in order to improve consistency, provide useful benchmarks and contribute to Key Performance Indicators (KPIs).

TYPE 4 - Physical monitoring, testing, and analysis of performance statistics
This can provide objective information, most easily on the internal environment and utility consumption - for which detailed information is increasingly available routinely from electronic building management systems (BMSs), at least in principle.

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10   We are liaising closely with the parallel PII project on this aspect - Learning from Experience (LFE) [13].
11   Reviews of demonstration projects by the UK Movement for Innovation (M4I) and similar activities suggest that participation and word of mouth is much more effective in practice than databases and the printed word, at least in the early stages.
12   For example of staff, users, business managers, facilities managers, customers, and community interests.

5   How can we get more feedback to happen?

NOT ENOUGH FEEDBACK IS HAPPENING
The construction industry is often slow to learn from its completed projects - particularly how they perform in the hands of their users. Problems can therefore persist, successes be overlooked, and innovations miss their targets. Feedback is not routine in the industry: there are many barriers and not enough drivers; and in this the US experience reviewed above sounds very similar to the UK's. Perhaps the greatest barrier is that the benefits are spread around, so no one party sees themselves as reaping enough of the benefit to bear the cost. The supply side also fears that they may expose problems which they will then get blamed for.

BUT SHOULDN'T THE SUPPLY SIDE GET THINGS RIGHT FIRST TIME?
Ideally perhaps they should, but this is unrealistic in the present situation where they do not routinely examine how their products really perform in practice. In addition, by their very nature, innovations cannot always be "right first time". However careful you are in planning and testing, there will always be surprises, as is well known in R&D with its all-pervasive "Murphy's Laws"[13]. That is why scientific method is based on hypothesis, followed by experimental testing.

MOST CONSTRUCTION PROJECTS HAVE EXPERIMENTAL ASPECTS
Except for the most standardised and repetitive projects (and even these need monitoring and feedback for quality control purposes), every new piece of construction is to some extent a hypothesis and its performance in practice is the experiment. But where are the designer/experimenters? In the distant past, when technology and user requirements changed slowly, one could perhaps rely on evolutionary feedback and the occasional catastrophe. More recently, one could look to academic study and the test of time. But today, when things are changing so fast, there is really no alternative to learning on the job.

THE PROBLEM FOR CLIENTS
Clients are becoming aware that insufficient feedback within the industry is a problem for them too; particularly now they are coming to understand that facilities cannot be taken for granted - but can add value to (or subtract it from) their core businesses. At the same time, many have outsourced their feedback loops and find themselves more at the mercy of the supply side of an industry which frequently does not ask the right questions and does not know enough about what happens to its products after they have been handed over. While abject failures will come back to haunt them, disappointments often do not, and can even be regarded as successes and repeated virtually indefinitely.

WILL CLIENTS HAVE THE TIME?
How can we make feedback happen in a world where clients seem to be increasingly short of time? Many clients do not even have time to make their requirements clear to design teams and to get involved in the necessary dialogue as the project progresses. How will they fit in feedback too? And how will the results be managed, not just for the clients and teams concerned, but for buildings which will also be in the public interest and to meet the challenges of sustainability, which stretch far into the future and well beyond the business concerns of today's customers?

DOES POST-OCCUPANCY EVALUATION GET IN THE WAY OF FEEDBACK?
We started the project seeing close parallels between feedback from completed projects and post-occupancy evaluation (POE). While undoubtedly there are, our research suggests that we should distance feedback from POE, as revealed in our workshops and in the FFC review in the USA [1]. Rightly or wrongly, for many people POE has an aura of being somewhat academic and remote from clients, practice and project delivery. Instead, feedback - together with follow-through beyond project delivery into aftercare support - needs to be seen much more as a routine part of any project.

FEEDBACK IN THE REAL WORLD
For the current project, we are therefore promoting feedback as something practical, relevant and immediate. We suggest it is regarded as what Robson [5] calls real-world research. Some principles (developed from Box 1.2 of Robson's book) are summarised in Table 1 below. This is not to say that feedback cannot be used to test and develop theories - far from it - but that its focus should be on results and improvement.

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13   Murphy's First Law: If it can go wrong, it will.
        Murphy's Second Law: Murphy was an optimist.

TABLE 1
REAL WORLD RESEARCH *(Source: Robson [5])*

Solving problems	rather than	just gaining knowledge
Predicting effects	rather than	finding causes
Getting large effects	rather than	relationships between variables
Looking for robust results & actionable factors	rather than	assessing statistical significance
Developing & testing programmes, interventions, services etc.	rather than	developing and testing theories
Field	rather than	laboratory
Outside organisation	rather than	research institution
Strict time constraints	rather than	as long as the problem needs
Strict cost constraints	rather than	as much finance as the problem needs
Little consistency of topic	rather than	high consistency of topic
Topic initiated by sponsor	rather than	topic initiated by researcher
Often generalist researchers	rather than	typically highly specialist researchers
Little use of "true" experiments	rather than	much use of "true" experiments
Multiple methods	rather than	single methods
Oriented to the client (particularly in reporting)	rather than	oriented to academic peers
Viewed as dubious by many academics	rather than	high academic prestige
Need for well developed social skills	rather than	some need of social skills

WHERE SHOULD WE START?
In our discussions and in some of the papers reviewed, people have mentioned the need for a cradle-to-grave approach, with a construction or refurbishment project being merely a small incident in a facility's life cycle; and an even tinier one in that of the organisations involved. People also mention a comprehensive approach, covering not just construction-related issues but overall business benefits.

IS THE BEST THE ENEMY OF THE GOOD?
We agree with these sentiments, but also see that - in spite of the undoubted benefits - many organisations are not prepared to invest in feedback systems. These may be two sides of the same coin: they fear elaborate feedback exercises because of their likely complexity, expense and risk. To stop the best becoming the enemy of the good, we suggest starting small and simple: even a little useful feedback can begin to turn what are so often vicious circles into virtuous ones, so starting small and simple may be the best way of developing effective systems which become comprehensive over time. As Probe has shown, looking at just a few things begins to unwrap into many other issues. The agenda soon becomes longer than most organisations can cope with - so the problem rapidly becomes one of prioritisation, and of identifying specific issues which need to be explored in more depth if the parties involved are sufficiently interested in them.

BUSINESS BENEFITS, OR JUST BETTER BUILDINGS?
Just getting sounder buildings would be a good start. As said in a CRISP review [8], most designers only notice that something is wrong when they are asked to investigate a failure. For example, in 1998, on the basis of Probe results, we warned a developer to look to the airtightness of their new buildings. Initially their designers said all was well when clearly it wasn't. Then they said it would cost more, but the developer did not want to pay as their customers wouldn't. But then the developer had a problem building. Further analysis then showed that over one-quarter of all complaints from their tenants were related to draughts, arising either from unwanted air infiltration, from HVAC system and control problems, or a combination of the two. In turn, questionnaire surveys reveal that complaints of this kind are statistically correlated with reductions in occupants' perceived productivity. The developer is now in the vanguard of those seriously preparing their consultants and contractors to meet the pressure test requirements newly incorporated in Approved Document Part L2 of the Building Regulations for England & Wales [2].

FEEDBACK AND PROJECT DELIVERY

The US experience [1] is that where POEs are done routinely, they nearly always happen in the first year after practical completion. To get closer links between the supply side, users and mangers during this vital year is also a conclusion of the Probe team ("sea trials") and other authors (e.g. the "soft landings" idea of RMJM and the University of Cambridge, the "continuous commissioning" process developed by ABS, and the RIBA's plea for more involvement in POE). It is time for clients and the industry to consider making a commitment to feedback (right through the project as well as in first year of operation) a standard part of project delivery.

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