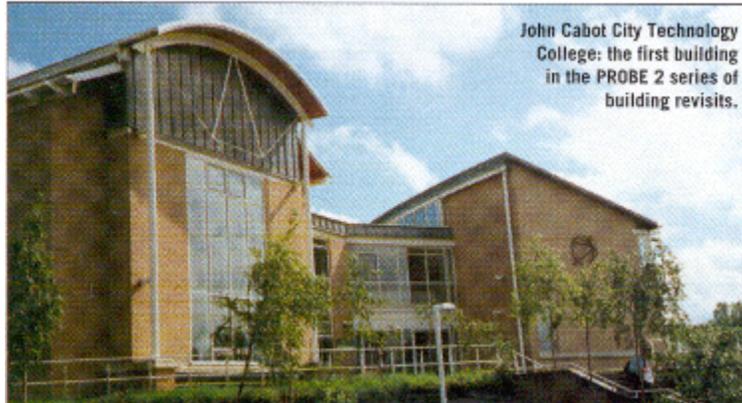

Probe 2 Research methods

B*uilding Services Journal* is embarking on a second series of post-occupancy building reviews. To kick off the series, the PROBE team explains how the research will be carried out, the assessment techniques to be used and how the research is being extended into client/designer relationships and tests for building airtightness.



BY THE PROBE TEAM

Feedback is a crucial part of the construction process, a vital mechanism by which clients, designers and contractors can learn from experience. Sadly, the adversarial nature of the construction industry militates against ongoing relationships, promoting instead a “quick to capitalise, slow to learn” culture, in which the losers are too often innocent bystanders — the building occupants. The original PROBE research project aimed to tackle some of these issues. New buildings reviewed in *Building Services Journal* were revisited to find out how well they performed. The survey looked not only at the technical and energy issues, but attempted to assess the degree of occupant satisfaction with the buildings, and the ease with which they could be managed.

Overall, PROBE revealed a need for better briefing, a greater recognition of the demands that buildings make on their occupants and a return to more robust and sometimes simpler systems. The work also revealed a continuing need for feedback, and this is what PROBE 2 is all about. From October 1997, *Building Services Journal* will be reporting the in-use performance of another seven buildings, starting with the John Cabot City Technology College in the October issue.

The method of investigation

While the methods of investigation will be broadly similar to the first project, the PROBE team intends to examine building types and servicing systems not previously covered in the series, such as the Termodeck thermal storage system, adiabatic cooling and air-to-air heat recuperators.

PROBE 2 will continue the established research team of HGa Consulting Engineers, Bill Bordass Associates and behavioural scientist Adrian Leaman of Building Use Studies.

Once again, the buildings will be surveyed in their third or fourth year of existence, any earlier than this and they won't have settled down, much later they will have either lost topical interest or been altered in some way from the original specification.

The PROBE team will also cover more ground than in the earlier project. This extra depth comes from evolving hypotheses and benchmarks about building performance, consideration of water consumption in addition to the energy consumption analysis, and diagnostic air leakage tests which will be carried out by the Building Research Establishment.

The energy surveys

The energy surveys will once again be based on the Office Assessment Method (OAM), an integral part of the BRE's Energy Assessment and Reporting Methodology'.

The OAM provides a rigorous structure for an energy audit, allowing a picture of energy use to be built up. It does this by reconciling metered patterns of energy consumption with an assessment of individual end uses. No comprehensive monitoring and data logging is required — the OAM simply guides the user towards items which might need more detailed investigation.

Apart from requiring improved explanations, sign-posting and the development of computerised forms, the OAM was deemed eminently suitable as an energy targeting tool, also proving to be particularly powerful in the assessment of electricity consumption.

The OAM is now the subject of a research project, funded by a Partners in Technology grant from the Department of the Environment, Transport and the Regions (DEER) to turn the method into an official CIBSE Technical Memorandum.



The BRE pressure testing its new Environmental Building. This rig will also be used to pressure test the PROBE 2 buildings.

The occupant surveys

PROBE has pioneered a powerful and compact approach to surveying building occupants. Given that people are unlikely to accept a questionnaire on more than two sides of A4 paper, the survey firm Building Use Studies (BUS) developed a two-page pro-forma derived from questions first used in 1985, and subsequently refined by BUS and the BRE.

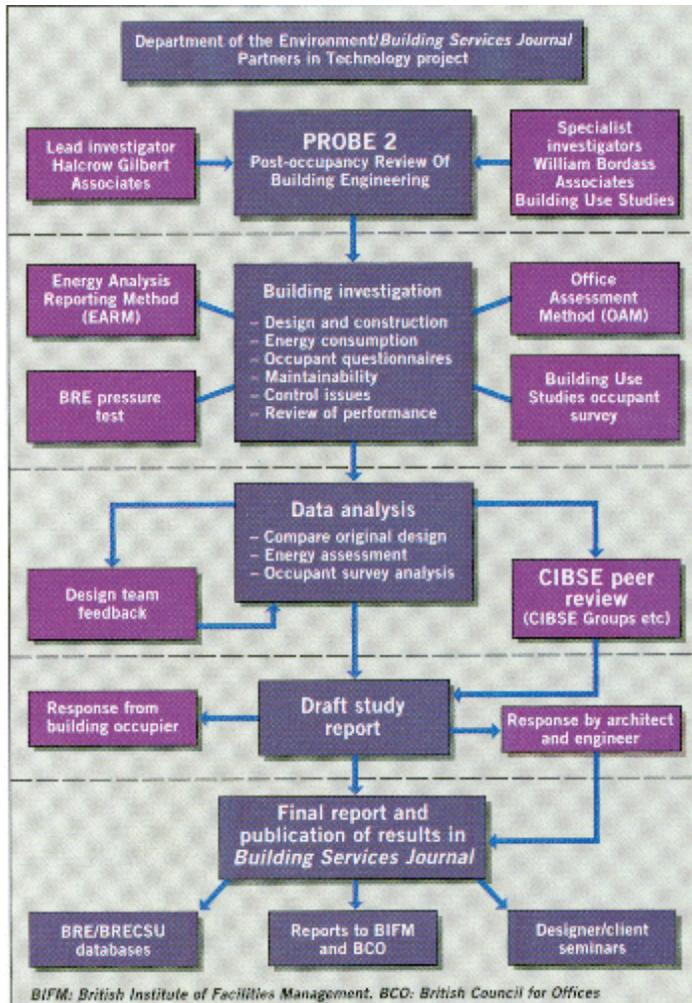
A few additional questions have been added on perceived control and speed of management response to problems. In earlier studies these had been found to be important components of occupant satisfaction. The PROBE survey results have helped the PROBE team to explore these hypotheses and their implications. Having proved effective, the survey method is now being used under licence in the UK, Australia and

New Zealand ².

Most of the questions are on seven point scales, typically from one (very poor) to seven (very good). But what score should one expect? As most of the questions have been used on 50 or more buildings, robust benchmark statistics are available. Hence, while one might think that a scale mid-point score of four was mediocre, in relation to a known benchmark of, say, 3.5, it is actually relatively good.

PROBE 2 aims to distribute questionnaires to about 100 permanent staff, or to all the staff for buildings with less than 100 occupants. In larger buildings, the numbers are increased to try and obtain a 10% sample.

The PROBE team has sought — and nearly always obtained — a 90%-100% response rate by the simple expedient of warning people when the questionnaires are coming, handing them out in person and collecting them an hour or two later with a final sweep for laggards.



PROBE 2 has been refined to include more feedback from architects and engineers, and also to include pressure testing of all the buildings studied.

Quality assurance

PROBE 2 does not pretend to provide definitive answers on building performance. Inevitably the PROBE reports are a snap shot, and comments on a building’s long-term performance are made in the context of the continual churn to which all buildings, and

the organisations that inhabit them, tend to be prone.

That said, the PROBE process is subject to several levels of quality assurance (qa). Each PROBE investigation alternates between the two investigators, Hga Ltd (the lead investigator) and William Bordass Associates, both commenting on the work of the other. HGa also has its own internal qa system.

Accuracy assessments are included with the OAM and BUS procedures, with the data analysis including feedback from the original architect and building services engineer prior to a full report being drafted.

While the report is checked by the building owner for factual accuracy, the original architects and services engineers are offered the opportunity to comment on the findings in the resulting article in *Building Services Journal*.

Inevitably, such research raises contentious issues, some of which cannot be resolved without further work. For example, do the questionnaire responses on self-assessed productivity bear any actual relationship to measured productivity? In strict quantitative terms, nobody knows for sure — particularly for non-routine office-type work — but the question on self-perceived productivity has been widely used and benchmarks are available. Evidence from a wide range of industrial, military and commercial sources also points to a close association between perceived productivity and actual output.

Questions have also arisen on the relative importance of permanent staff to temporary staff. Certain buildings, particularly in the educational sector, tend to have a high proportion of temporary occupants. However, responses from the permanent occupants provide an indication of the building's longer term performance by dint of familiarity with systems and with the building management. Such data is also more appropriate for comparisons between buildings, for which benchmarks are more readily available.

The PROBE surveys reveal that short-term occupants tend to be less critical in their comments, although not always. PROBE 2 hopes to consider these differences in greater detail. Energy benchmarks are another moot point, and the PROBE team has chosen what it considers to be the most appropriate for the building type under scrutiny. Where a suitable benchmark doesn't exist, PROBE will try and relate energy consumption to the nearest available comparator.

New initiatives

Courtesy of extra funding by the DEER, PROBE 2 will promote a new initiative aimed at fostering the relationship between the original design teams and their clients. Intended to test the development of a formal feedback process, PROBE 2 will host two review seminars, each one involving up to four clients and design teams.

The second initiative supports the campaign for building airtightness, launched by the current CIBSE president Geoffrey Brundrett (see "Building pressure" in this month's main feature on ventilation). Funding is being sought to carry out pressure tests on every building surveyed under PROBE 2 to identify the performance of the building envelope in relation to that of the building services.

The Building Research Establishment will be carrying out the tests, the data from which will add to the database held by the BRE and the BSRJA. The results will also be compared to the recently agreed good practice infiltration level of $5 \text{ m}^3/\text{h}/\text{m}^2$ of facade at 50 Pa.

It's your PROBE

PROBE has been strongly supported by the occupiers and designers of the buildings surveyed. This requires considerable courage, since inevitably not all the results are flattering. That said, all the PROBE buildings studied so far have been better than average, and some have given outstanding performance.

It is only by learning from its disappointments as well as its successes that the industry can improve buildings, and help designers and occupants gain a greater understanding of the implications of the features they want.

Perhaps inevitably, some publications reporting PROBE second-hand have either sensationalised or cherry-picked from the results to fit some preconception. In order to preserve accuracy, the PROBE team will be issuing abridged versions of the reports to appear in the magazines of the British Institute of Facilities Management (BIFM) and the British Council for Offices (BCO).

References

¹The EARM was developed under the EnREI (Energy-related Environmental Issues) research programme managed by the Department of the Environment, Transport and the Regions (DETR).

²For more information contact Building Use Studies on (tel) 0181-580 8848.

The PROBE team comprises Paul Ruyssevelt, Robert Cohen and Mark Standeven from HGa, Roderic Bunn, editor of *Building Services Journal*, Bill Bordass, principal of William Bordass Associates and Adrian Leaman of Building Use Studies.