Look and learn

Despite the time and costs involved, wider acceptance of monitoring is gaining momentum. *Hattie Hartman* and *Laura Mark* report

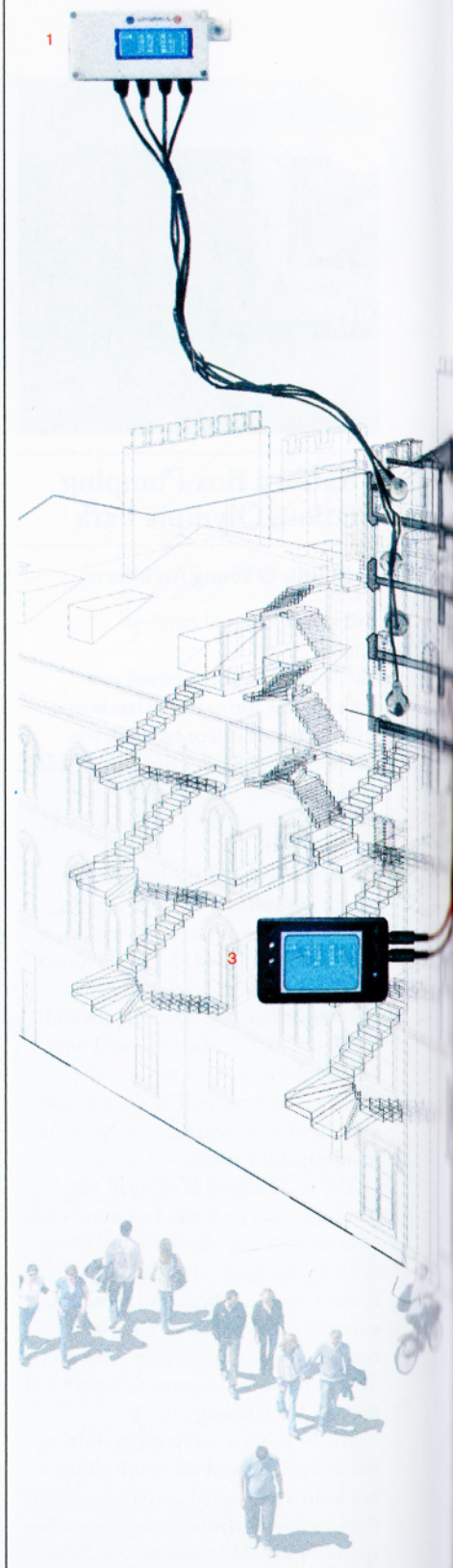
Solving the building performance gap – the discrepancy between how buildings are designed to perform and how they actually perform in use – is at the top of the agenda for delivering a greener built environment. So why don't we, as the Nike dictum goes, 'Just do it?'

The answer is that good monitoring is complex, time-consuming and expensive. It requires what Sheffield University's Fionn Stevenson refers to as 'socio-technical' understanding of how buildings work. This often means traipsing through plant rooms to read meters and then a lot of head-scratching to make sense of inconsistent data. It also means talking to occupants to find out exactly what works and what doesn't.

Below Bessemer Grange Primary School, London, by Architype

To date, most in-depth monitoring has been either government-funded or university-based research, and many architects in practice have viewed this work as someone else's affair. This is partly because monitoring is quite technical and involves interpreting complex numerical data, which architects aren't generally trained for. Yet some proactive architects are now reclaiming monitoring as a service they can offer.

According to Matt Colmer, the Technology Strategy Board (TSB) lead technologist responsible for the current tranche of Building Performance Evaluation (BPE) funding, the average cost of a two-year study for a non-domestic building is £60,000. >>



5th Studio: visualisation of monitoring undertaken at New Court, Trinity

Legend

1. Hygrothermic gradient monitoring
2. In-situ U-value measurment
3. Thermal imagery
4. Air-pressure testing
5. Monitoring thermal and moisture inputs

ARCHITECTS LEADING THE WAY – TECHNOLOGY STRATEGY BOARD BUILDING PERFORMANCE EVALUATION PROJECTS LED BY ARCHITECTS

Architype Bessemer Grange Primary School (page 60) and Children's Centre
Aedas Loxford School, Brine Leas Sixth Form School (top right), Pool Innovation Centre and Tremough Innovation
Richards Partington Architects Greenfields Community Housing Headquarters (bottom right)
Feilden Clegg Bradley Studios Woodland Trust Headquarters (top left), Woodland Trust Concrete Radiator Performance Analysis
ECD Architects Castle Hill Primary School, Morrison Bowmore Distillers
bere:architects Mayville Community Centre (bottom left)
White Design Rogiet Primary School, Oakham CofE Primary School
Quattro Design Architects, Coleford Community Centre

IMAGES CLOCKWISE FROM TOP LEFT: PETER COOK, AEDAS, TIMOTHY SOAR, MARK MARTINES

Stevenson points out that, although this represents just 1 per cent of the budget on a £6 million project, 'the biggest sticking point for BPE is cost'. Clients want the magical £5,000 version, which Bill Bordass and Adrian Leaman [of the Usable Buildings Trust] have long promoted, but this is only a first stab. If early results from this type of BPE 'lite' study show problems, then further investigation can become expensive.

For practices that have been involved with monitoring for some time – Architype, Feilden Clegg Bradley Studios and bere:architects, to name three, understanding how their buildings operate in use is integral to the way they work and part and parcel of their USP. Bere:architects' Sarah Lewis observes: 'One of the benefits of being so hands-on with monitoring is that … we have built up sufficient skills in house. Monitoring is an essential part of evaluating our completed projects and learning what elements are working well, where any issues are arising and how we can further improve our buildings in the future.'

You have to get to know your building; you can't just rely on a desktop study

Like bere:architects, Black Architecture sees post-occupancy engagement with a project as essential. At its CAFOD project offices for a Catholic charity in Southwark, Black compiled a graphic user guide and ran briefing events for all staff. It also worked closely with 'floor champions' to ensure that they understood the mixed mode conditioning strategy and inappropriate opening of windows was addressed. Black's Paul Hinkin explains: 'The most important thing that we do is to visit the building regularly and talk to users, including the facilities manager. We are there about once a month and we combine our visit with marketing tours for potential clients.' This basic level of service should not be beyond the reach of most practices.

At the opposite end of the spectrum, 5th Studio's ongoing work at New Court at Trinity College, Cambridge sets a new standard for pre-occupancy monitoring to establish a baseline for how any proposed interventions will impact performance. 'You have to get to know your building; you can't just rely on a desktop study,' says 5th Studio director Oliver North. 'You need to know whether moisture is a result of students drying laundry, a leaking rainwater pipe or something else.' Scrutinised by an interdisciplinary team, which included Max Fordham,

Bill Bordass, sustainability consultant Bill Gething, timber specialist Brian Ridout and Neil May of Natural Building Technologies, three years of detailed surveying, monitoring and modelling took in several rounds of thermal imaging, airtightness, in-situ U-value calculations, core samples, interstitial hydrothermal monitoring and more. The team also employed WUFI, a modelling programme developed by the Fraunhofer Institute in Germany, as a heat and moisture simulation tool for assessing condensation and mould risk in walls. North estimates that in future the time could be cut to a year, thanks to the team's steep learning curve at New Court. A minimum of a full year is necessary to allow monitoring through all seasons.

In addition to these individual projects, numerous concurrent industry initiatives suggest that wider acceptance of monitoring is gaining momentum. Arup acquired the intellectual property rights to Adrian Leaman and Bill Bordass' Building Use Studies (BUS) Methodology in 2009 and is launching it as a website for industry use at Ecobuild. Survey results will be benchmarked using a database of more than 700 buildings. According to Arup's Darren Wright, the new BUS Methodology website will engage with a network of licensed partners including consultants, contractors, architects and end-clients. Partners will have their own branded web pages and will be able to create surveys and receive results against the benchmark data set through the website. Another Arup initiative, which will be launched in April during Open City's Green Sky Thinking Week, is detailed monitoring of its own offices at 8 Fitzroy Road, London.

Also at Ecobuild, the Retrofit for the Future project is releasing its initial findings. A summary report will identify the energy and carbon emission performance of each RfF project, explore whether this has been achieved at the expense of other factors such as occupant satisfaction, and identify lessons from the programme. Meanwhile, at Sheffield School of Architecture, a two-year monitoring programme that will compare Urban Splash's Saxton Gardens in Leeds to White Design's LILAC Co-Housing development will be under way shortly.

Numerous architects are participating in the current round of TSB BPE funding, which includes 49 non-domestic and 58 new-build residential projects that will be monitored until 2014. Of the 49 non-domestic project teams, more than a quarter are led by architects. A workshop at the University of Coventry in late January gathered representatives of 36 of the 49 non-domestic teams to share progress. The data from the TSB projects will eventually be incorporated in the CarbonBuzz platform, which will be relaunched this spring. Such initiatives help to build a community of practice around the emerging art of performance monitoring.

Stevenson acknowledges that BPE is unlikely to ever become mainstream unless it is legislated for. Government Soft Landings, which will take effect from 2016, is a first step. 'Soft Landings automatically carries a two-year BPE study with it, and so we have BPE by the back door,' says Stevenson. In terms of architectural education, Stevenson's view is that 'until learning about BPE is a standard requirement of the RIBA Validation Criteria, we will continue to produce architects who do not understand the consequences of their actions'.

The savviest practices are already making waves with post-occupancy research. By refining their own approach, writing it into contracts from the beginning of projects and through funding it themselves, new ways of working are being developed. Findings from this work feed into future projects and can only make buildings perform better. And isn't that what we all want – sustainable architecture that performs as designed? ■

MONITORING AND THE PLAN OF WORK

Architects are not used to a continuous involvement in projects following completion but, if we are to increase the uptake of post-occupancy evaluation, this has to change. 'Making post-occupancy evaluation an RIBA stage is important,' says Architype director Mark Lumley. 'Having a contingency for improvements within the defect period is necessary. Both architects and clients need to recognise that buildings may need tweaking after completion.'

The RIBA is starting to recognise this increase in monitoring post-practical completion. The new RIBA Plan of Work 2013 has a final stage, entitled 'In Use', which takes into account both post-occupancy evaluation and Soft Landings. However, this is an additional service within the Plan of Work. It will be up to individual architects to decide whether they want to engage with it. It has been suggested that this stage could be charged on a time basis, and in fact writing this into the Plan of Work may make this easier for the architect, with clients more favourably accepting it as part of the construction process rather than an add-on once the building has been completed.

As knowledge of what is required post-completion increases, clients, contractors and architects need to be more flexible and ready to adapt contracts. bere:architects' approach is to adopt Soft Landings from the very beginning, and so this is always accounted for in the initial contract. When the extent of monitoring for the Camden Passivhaus changed as a result of additional funding, the contract had to be revised. For Acharacle Primary School in Argyll, Gaia Architects wrote two years of monitoring into the initial brief for The Highland Council.

With government Soft Landings coming into effect in 2016, two-year monitoring will become obligatory on public projects, with an inevitable ripple effect through industry.

Laura Mark