CAT Machynlleth Building Performance Assessment and Evaluation 12 May 2015 PART 1.2

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BUILDING PERFORMANCE IN USE: THE GREAT UNKNOWN

How did we get here?

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Why aren't designers and builders better tuned in to outcomes?

- Not what clients or government have asked them to do: *"hand over and walk away" is systemically embedded in standard procedures and contracts, so follow-through is not part of the standard offering.*
- Clients and government haven't set aside time and money for tuningup after handover, and have often preferred to bury any bad news.
- The industry and the associated professions didn't fill the vacuum created while central and local government progressively outsourced its technical expertise, research and performance feedback work.
- The policy emphasis has been on construction, not performance in use, even when feedback information has been revealing problems.
- Rigid divisions between funding of capital and operational costs getting worse if anything, in spite of all the talk.
- "Post-Occupancy Evaluation" (POE) is a construction industry perspective, with handover the end, not the beginning! *Too often seen as academic and mostly about perceptions.* We prefer BPE.

Part 1.2 How did we get here?

- 1. Governments, markets and building professionals
- 2. Some history
- 3. How differences can mount up
- 4. Moving forward

GOVERNMENTS, MARKETS AND BUILDING PROFESSIONALS

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Sustainability raises challenging moral and ethical dilemmas

- Work 'after us' and for 'the other'.
- Intergenerational equity.

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- Deferred impacts over long periods.
- Differential geographical and social impacts.
- Growing levels of uncertainty and unpredictability.

It needs vision, imagination, reflection and commitment

"[it] does not tempt us to be less moral than we might otherwise be; it invites us to be more moral than we could ever have imagined." MALCOLM BULL

How societies structure expertise

"At present, professionalism seems to hold its own.

"It has stayed ahead of commodification ... but may ultimately lose out to organisations ...

"new hiring patterns... and the loose form of organisational professionalism point to much weaker control of work by the professions themselves."

ABBOTT (1988)



SOURCE: A Abbott, The system of professions, University of Chicago Press, 1988, page 325.

Where we now seem to be in the UK

COMMODITIES ORGANISATIONS But do the regulators understand what they are doing? With so much REGULATIONS outsourced, where are the **TARGETS** and **TICK-BOXES** vision, the integration the public interest, and the *"intelligent customer"?*

Onto the bonfire? Are we too concerned with markets and trading, not long term public interest?

"Market fundamentalism has taken root in the machinery of government" JOHN ASHTON, former FCO Climate Spokesman (2013)

AND EARLIER ...

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"The English will spare no expense to get something on the cheap." NIKOLAUS PEVSNER (circa 1960)

How do we maintain the chain of progress?

Where is the public domain infrastructure for improving building performance in use?

Why haven't we taken account of the evidence under our noses? "Any system without feedback is stupid." ... AMORY LOVINS

"... unlike medicine, the professions in construction have not developed a tradition of practice-based user research ... Plentiful data about design performance are out there, in the field ... Our shame is that we don't make anything like enough use of it"

FRANK DUFFY, PPRIBA, Building Research & Information, 2008

- Procurement routes are often salami-sliced
- Most designers and builders hand over the keys and go away, they don't follow through and capture the feedback.
- By outsourcing and privatising, government has disconnected many of its feedback loops, *and nothing has been put in their place.*
- Too many people want to bury bad news ... or point the finger.
- Evidence from case studies has been dismissed as anecdotal, not used to provide feedback, insights and advance warnings.

We need to get the virtuous circles going

SEE: B Flyvbjerg, Five misunderstandings about case study research, Qualitative Enquiry <u>12</u>, 219-245 (2006),

Five misunderstandings about case study research

- General, theoretical knowledge is more valuable than concrete (context-dependent) practical knowledge.
 NO: They complement each other.
- 2. One cannot generalise on the basis of an individual case. *NO: Individual cases and outliers can be bellwethers.*
- 3. The case study is most useful for hypothesis generation. *NO: They can also test hypotheses, using multiple methods.*
- Case studies contain a bias to verifying preconceptions.
 NO: They can often provide new and richer insights, BUT: they need to be done with a degree of independence.
- 5. Case studies do not allow one to develop general propositions. **BUT:** They help us develop coherent strategies for the future.

AND: "Few things are harder to put up with than the annoyance of a good example" ... MARK TWAIN [or the embarrassment of a bad one it seems].

REFERENCE: B Flyvbjerg, Five misunderstandings about case study research, Qualitative Enquiry 12, 219-245 (2006),



SOME HISTORY *the false dawns of BPE*

Buildings last a long time so good performance is in the national interest

• With traditional construction, feedback was slow and evolutionary.

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- In the 18th and 19th Centuries, with burgeoning industry, powerful clients, and government struggling to keep up, the building professions began to emerge, *to help ensure fairness and protect public interest.*
- In the 1920s, the government set up the Building Research Station (*later BRE*) to provide guidance in the national interest. *Its initial focus was on basic science and providing advice to government and the construction industry. It later broadened out into a wide range of performance issues.*
- As the public sector grew, so did the number of building-related staff in design, construction, property, maintenance and management.
- Many Ministries had information services, research and technical units supporting their buildings-related activities. *They were far from perfect, but obtained both explicit and tacit feedback from their activities, produced a wide range of guidance material, and acted as "intelligent customers".*

50 years ago: RIBA Plan of Work (1963) STAGE M: Feedback

PURPOSE

To analyse the management, construction and performance of the project.

TASKS TO BE DONE

Analysis of job records. Inspections of completed building. Studies of building in use.

PEOPLE DIRECTLY INVOLVED

Architect, engineers, QS, contractor, client.

¹⁴Building performance evaluation started in some universities in the 1960s, *but ...*

Building performance

Building Performance Research Unit



Pioneers included the University of California, Berkeley and the Building Performance Research Unit at Strathclyde (BPRU).

However, after BPRU's seminal book in 1972, the subject failed to gather momentum, as it did not fit well with academic criteria, or get sustained industry support.

"Unfortunately, interdisciplinary subjects have a way of escaping from any discipline whatever." ... ERIC DREXLER

In 1972 the RIBA removed Stage M: Feedback from its publication *Architect's Appointment.*

REFERENCE: T Markus et al, Building Performance, Applied Science Publishers (1972)

And the tide turned in government ...

- Widespread disruption and disillusionment in the 1970s.
- Ascendancy of ideas about free markets, competition and choice; a *de facto* inefficient public sector, and *"no such thing as society".*
- Professionals began to be seen as an elitist conspiracy against the public, and treated by government as just another business.
- The Rothschild Report 1972, advocated a customer-contractor relationship for government-sponsored applied research ... but what happened to its idea of an intelligent government customer?
- Outsourcing and privatisation of professional skills and in-house research from government, including Building Research Establishment.
- Dismemberment of the Department of the Environment 1997-2002.

WHERE IS THE INSTITUTIONAL MEMORY?

Nobody else (e.g. professional institutions), has helped enough to fill this gap and provide continuity, so policy is based more on hope, predictions, & lobbies, than experience of what works and what really needs attention.

"The social contract has been fractured by outsourcing" ... AL GORE

Which industry and market is really responsible for building performance?

None of these: it's much more complicated than that.

The lack of traction is not a market failure, but a category error!



¹⁷ Buildings policy has also tended to focus on construction, *not performance in use ...*



REFERENCES: The Egan Report (DTI, 1998), the Fairclough Report (DTI and DTLR, 2002)

The elephant isn't in the room, IT IS THE ROOM!



STRATECY

SOURCE: Bruce Flye, 2012, www.bruceflye.com/concept-graphics/illustrations/4092610

Summary: A confused situation.

- Building performance is confused with construction and markets.
- Building-related policy measures don't join up, theoretically- based and conflicting: not converging effectively onto actual performance in use.
- Policies add complication, *instead of getting people to focus on what really needs doing to get things to work better.*
- Salami-sliced, transactional procurement processes not fit for purpose.

FOR BUILDING ENERGY PERFORMANCE IN USE:

- Government has failed to provide core technical infrastructure that could help organisations, individuals and markets to self-organise: *e.g. no investment in in-use benchmarking for more than a decade.*
- Nobody else can do it without government buy-in and focus.
- Designers are trapped in the ghetto of "Regulated Loads".
- DECs that do disclose performance are being sidelined by DCLG.
- Too much emphasis on carbon. First energy, then carbon.

MARKETS CAN'T SOLVE THIS ALONE: IT NEEDS SUPPORT

HOW DIFFERENCES CAN MOUNT UP

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Design intent to reality: how credibility gaps can mount up for energy

DESIGN ESTIMATES NOT SET CLEARLY OR REALISTICALLY:

- Little or no transparency between design estimates and in-use outcomes.
- Not everything is counted: *only normal "regulated" services in typical spaces.*
- Estimates are too optimistic, e.g. no night loads, perfect control.
- A policy concentration on carbon can draw a veil over energy performance.

SLIPPAGE DURING DESIGN AND CONSTRUCTION:

- Design does not get into areas of critical detail, or understand the users.
- Inappropriate build quality.
- Changes to design and client requirements, vandal "Value Engineering".
- Changes during construction and commissioning: *negotiations, substitutions, build quality, systems, deployment of controls, delays.*

SLIPPAGE AFTER COMPLETION:

- No follow-through, initial aftercare, fine-tuning, monitoring, or feedback.
- Fitout changes and clashes.
- Spilt responsibilities: *developer/owner, landlord/manager/tenant, outsourcing. Principal/ agent problems. Procurement of controls and FM services.*
- Unintended consequences and revenge effects, *technical and management shortcomings, controls problems, poor user interfaces, default to ON.*

DESIGN INTENT NOT MANAGED THROUGH THE PROCESS AND INTO USE

How differences can mount up 1: the design claim, as published

Annual CO₂ emissions of energy use in a low-energy office building

kgCO2/m2 Treated Internal Floor Area at UK ECON 19 CO2 factors of 0.19 for gas and 0.46 for electricity

<< Onsite renewable supply << >> Building energy demand >> expressed as CO2 20 30 40 50 60 70 80 0 100 110 120 130 140 -10 10 Heating+hot water gas (normalised) Mixed mode head office 15 kg CO₂/m² claimed performance Heating and hot water - electricity Refrigeration and heat rejection Fans, pumps and controls Lighting Office equipment Catering and vending # Other electricity PV contribution (deduct) BENCHMARK for good practice Nat Vent Office >> Gas for catering BENCHMARK for good practice air-conditioned office >> BENCHMARK for typical air-conditioned office >>

How differences can mount up 2: the basis for the design claim

Annual CO₂ emissions of energy use in a low-energy office building

kgCO2/m2 Treated Internal Floor Area at UK ECON 19 CO2 factors of 0.19 for gas and 0.46 for electricity



How differences can mount up 3: what it said in the log book supplied at handover

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Annual CO₂ emissions of energy use in a low-energy office building

kgCO2/m2 Treated Internal Floor Area at UK ECON 19 CO2 factors of 0.19 for gas and 0.46 for electricity



How differences can mount up 4: actual performance in use, before fine tuning

Annual CO2 emissions of energy use in a low-energy office building

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How differences can mount up 5: it's not all bad news. Detailed feedback is vital

Annual CO2 emissions of energy use in a low-energy office building

kgCO2/m2 Treated Internal Floor Area at UK ECON 19 CO2 factors of 0.19 for gas and 0.46 for electricity



Learning from the fine structure: 6: how it relates to two other low-energy buildings

Annual CO₂ emissions of energy use in a low-energy office building

kgCO2/m2 Treated Internal Floor Area at UK ECON 19 CO2 factors of 0.19 for gas and 0.46 for electricity



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MOVING FORWARD Stop diverging from design intent: Converge onto operational reality

[°]Energy Efficiency in the Built Environment (EEBE - Cambridge) Barrier Categories

So many barriers to surmount ... what could we do that could enable people to come together in the middle, quickly?



If you wanted to improve building performance in use, *what would you do ...*

A. Focus on building performance in use?

OR

B. Do lots of other things and hope that performance will improve ...?



Why are have we been barking up the wrong tree? Why is actual performance not the proper target?

A vision:

Where good performance becomes normal

Make actual performance in use the objective function:

- Everyone must own their bit of the problem and concentrate their efforts.
- Review everything. Benchmark its elements where practical.
- Develop effective methods of communicating the results clearly, transparent between design, operation and policy.
- Effective leadership, focusing on performance.

With collective understanding that performance in use is the goal, systems used in producing, owning, occupying, using, managing, equipping, maintaining and altering buildings can measure their contribution towards it, based on what actually works; and identify what needs attention.

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UBT's proposed sticky interventions: seeding things with potential to snowball over time

Cultural adaptations, not just technical "solutions". To create virtuous circles of continuous improvement.

MAKE IN-USE PERFORMANCE CLEARLY VISIBLE

In a way that motivates people to strive to improve it. This needs a well-informed technical infrastructure to help the plethora of different systems to converge, particularly for energy and carbon.

CONSOLIDATE THE KNOWLEDGE DOMAIN

Develop building performance as an independent knowledge domain, to gain the evidence and authority to inform practice and policymaking.

REVIEW PROFESSIONAL ETHICS AND PRACTICES

A shared vision for building-related professionals to work in the public interest and engage properly with outcomes: *NEW PROFESSIONALISM*

A glimmer of hope: Stage M is back! now as Stage 7 in the RIBA Plan of Work 2013

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Fig 1. RIBA Plan of Work 2013 compared with RIBA Outline Plan of Work 2007

But will it make any difference; and how come the spreadsheet accompanying the 2013 Plan of Work allows its sustainability checkpoints to be switched on and off ?

SOURCE: RIBA Plan of Work overview (March 2013). See also www.architecture.com/planofwork

www.usablebuildings.co.uk