

University of Cambridge, Professional Practice Workshop
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DESIGN INTENT TO REALITY:

Achieving better building performance in use

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the **USABLE BUILDINGS TRUST**
www.usablebuildings.co.uk

Outline

1. Building professionals, building performance evaluation and the challenges of sustainability.
2. Why do many new buildings not perform as they are supposed to?

BREAK AND DISCUSSION

3. Changing our ways: A focus on outcomes, with Soft Landings.
-

PART 1

**Building professionals,
building performance evaluation,
and the challenges of
sustainability**

Building performance in use is in the public interest

- Buildings last a long time, well beyond the time horizons of their creators, with many players involved in different roles.
- As building users, the whole population has an interest in them working better in every respect.
- **Now we want to improve the performance of the stock,** *especially (but by no means only) in terms of energy and carbon. **However ...***
- the feedback loop from performance in use to construction and policymaking is poorly closed, *a disastrous oversight.*

SO DO WE UNDERSTAND WHAT WE ARE DOING?

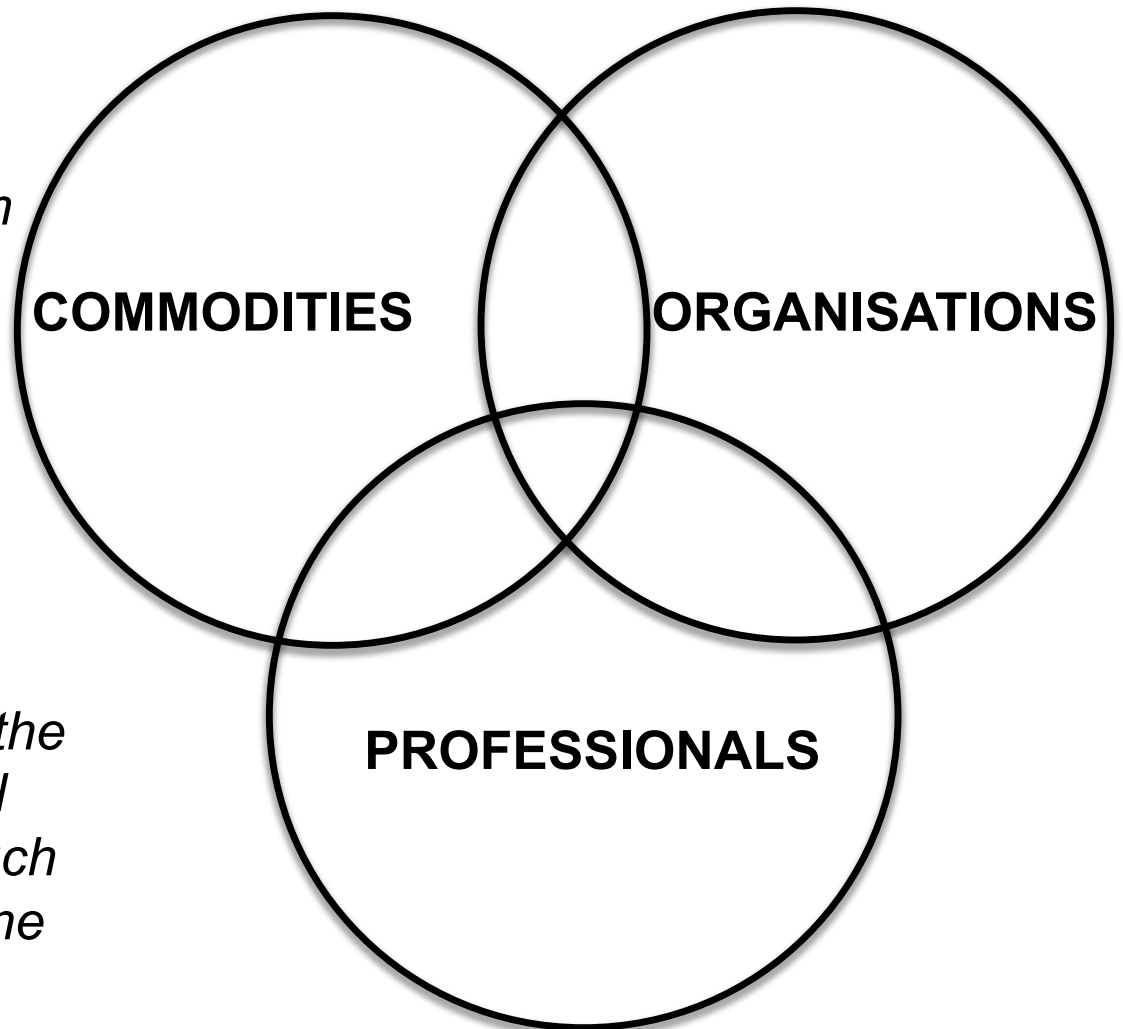
How societies structure expertise

“At present, professionalism seems to hold its own.

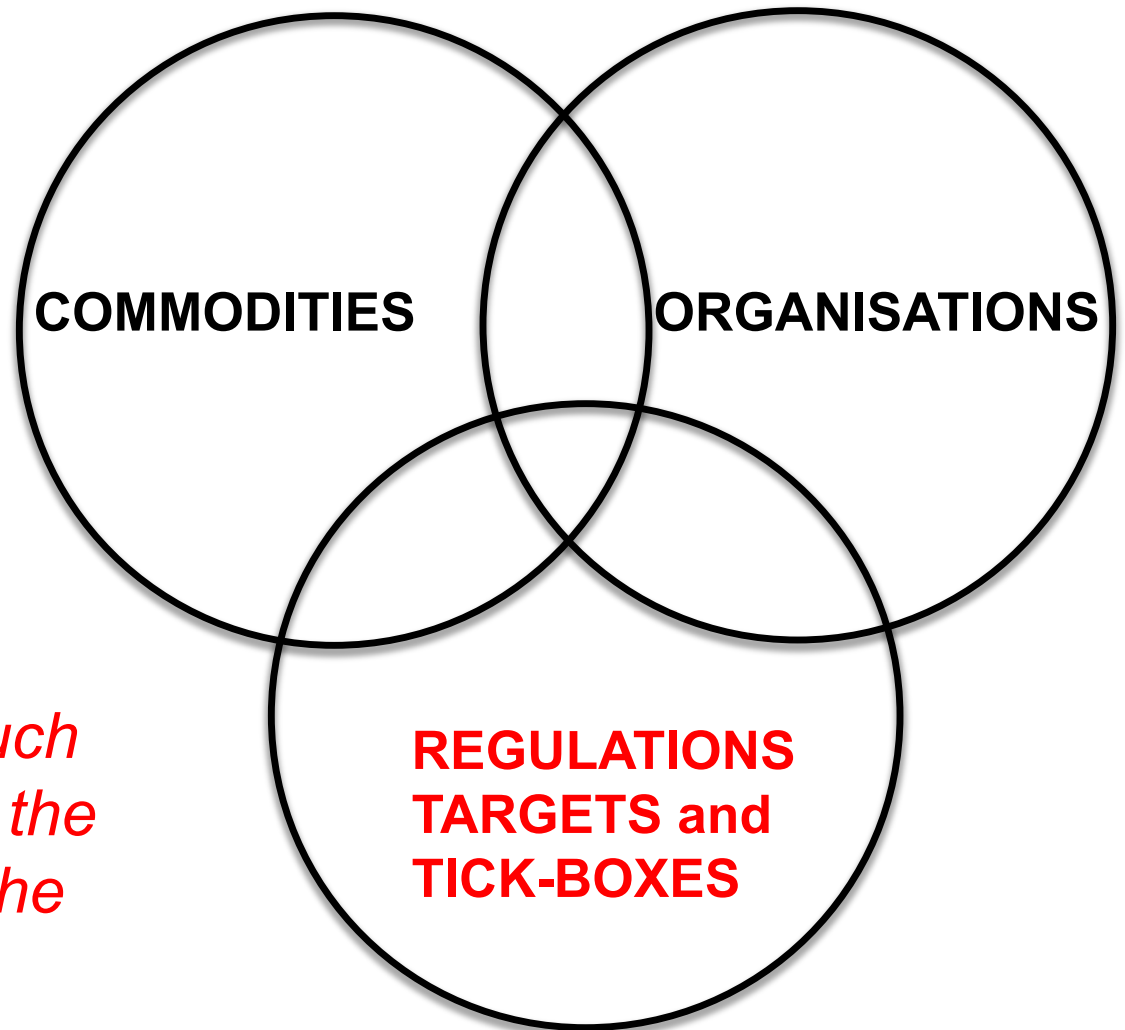
“It has stayed ahead of commodification ... but may ultimately lose out to organisations ...

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

ABBOTT (1988)



Where we now seem to be in the UK



But do the regulators understand what they are doing? With so much outsourced, where are the vision, the integration the public interest, and the “intelligent customer”?

And what now
with government
“cutting red tape?”

THE INDEPENDENT
TUESDAY 12 FEBRUARY 2013



Our red tape

John Morgan (Letters, 4 February) asks why Brussels is harming Britain's competitiveness, but not Germany's. It is because the red tape is of our own making. In the quest for “better regulation”, we transpose EU Directives into national law by “copying through” the clauses of their Articles. Any attempt at strategic integration is myopically regarded as “gold plating” and killed off. The result is disconnected bureaucratic fragments. It is time for some imagination in Whitehall.

BILL BORDASS
London NW1

The role of the building professional needs re-defining

- There's a big job to do, *in making new and existing buildings more sustainable.*
 - We're short of money:
we can't afford to spend it on the wrong things.
 - Current procurement systems are not fit for purpose:
we need to do things very differently.
 - We can't change everything tomorrow ...
but we can change our attitudes to what we do.
 - It's not a question of whether we can afford to do it:
We can't afford not to !
 - WHEN DO WE START?
TODAY. *We can't wait until 2050!*
-

Sustainability raises complex moral and ethical dilemmas

- Work ‘after us’ and for ‘the other’.
- Intergenerational equity.
- Deferred impacts over long periods.
- Differential geographical and social impacts.
- High 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

Changing the way we do things

- Many construction-related institutions require their members to understand and practice sustainable development.
- How can members do this unless they understand the consequences of their actions? *The real outcomes.*
- If they don't, they are working outside their region of competence ...
- **or in other words, not acting in a fit manner for a professional !**

SO HOW ABOUT?

- Changing attitudes to the nature of the job.
 - Re-defining perceptions of the professional's role, to follow-through properly and to engage with outcomes.
 - Closing the feedback loop – rapidly and efficiently.
 - Making much more immediate, direct and effective links between research, practice and policymaking.
-

New Professionals

follow design intent through into reality

- They understand what is needed *strategic briefing*
- Are clear what they want, and communicate it plainly *strategic design*
- Are ambitious, but realistic *question all assumptions, understand users*
- Follow things right through *e.g. using **Soft Landings** procedures*
- Review what they do *manage expectations, undertake reality checks*
- Make others aware of what they are after *specify: what, why and how*
- Check that things will work *technical feasibility, usability and manageability*
- Get things done well, with attention to detail *communicate, train, inspect*
- Finish them off *commission, operational readiness, handover, dialogue*
- Help the users to understand and take ownership *provide aftercare support*
- Review performance in use *including **post-occupancy evaluation***
- Work with occupiers to make things better *monitoring, review and fine tuning*
- Anticipate and spot unintended consequences *revenge effects*
- Learn from it all *and share their experiences*

THEY KEEP THINGS AS SIMPLE AS PRACTICABLE AND DO THEM BETTER

What put us on the track (1989) ?

December 1989

BEST PRACTICE PROGRAMME

Good Practice Case Study

Low cost major refurbishment
Policy Studies Institute
100 Park Village East, London NW1



- New atrium avoids the need for air-conditioning.
- New, smaller double-glazed windows improve thermal performance.
- Good daylight gives low lighting costs.
- Air quality sensors regulate fresh air intake.
- Solar energy collection from atrium exhaust air.

The Project

The Policy Studies Institute (PSI) is an independent policy research organisation concerned with economic and social studies and the workings of political institutions. Their research work benefits from a cellular office environment, with extensive support facilities including a conference suite which is regularly rented-out.

ENERGY

EFFICIENCY IN

OFFICES

What put us on the track (1991) ?

May 1991

BEST PRACTICE PROGRAMME

Good Practice Case Study

21

One Bridewell Street, Bristol

A new high quality air conditioned office with low energy costs



- Low fan energy consumption for an air conditioned office.
- High frequency lighting with effective central and local control.
- Naturally lit corner atrium.
- Effective energy management aided by electronic BEMS.

Arthur Young initially occupied the first and second floors, with tenants on the top three floors. Their merger with Ernst & Whinney in October 1989 confirmed the flexibility of the building, with their occupancy first increasing from 115 to 165 and subsequently expanding onto part of the third and all the fourth floor.

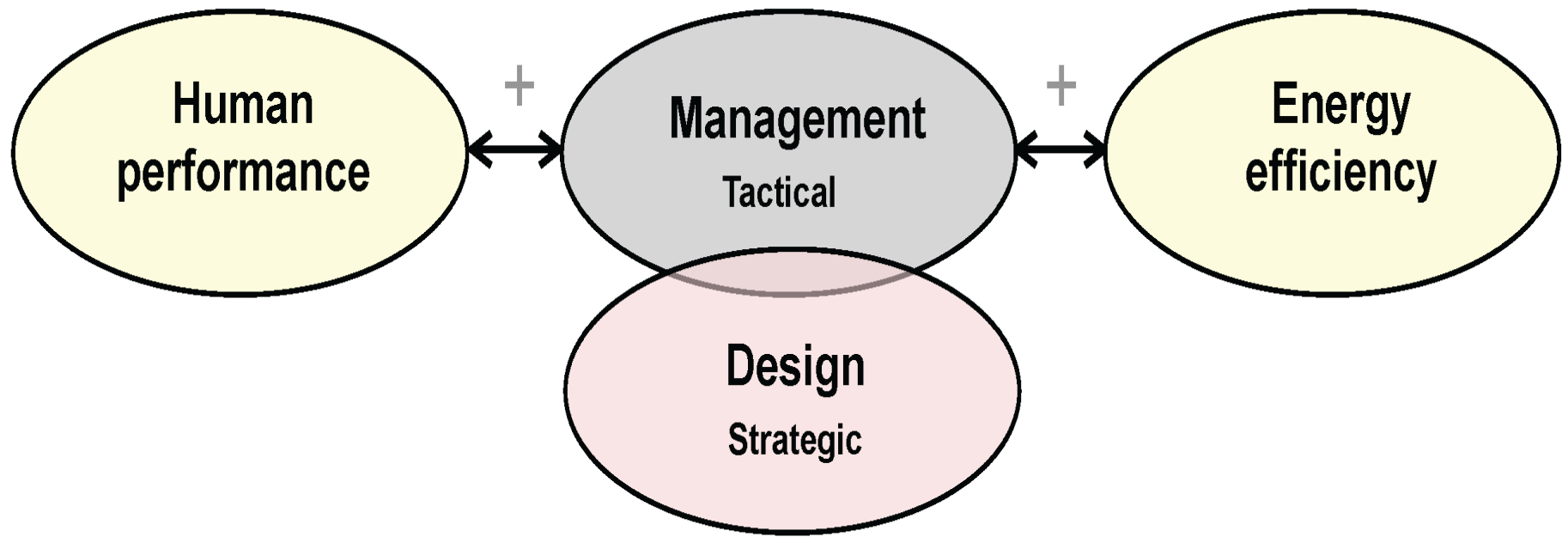
ENERGY

EFFICIENCY IN

OFFICES

Where good things happened ...

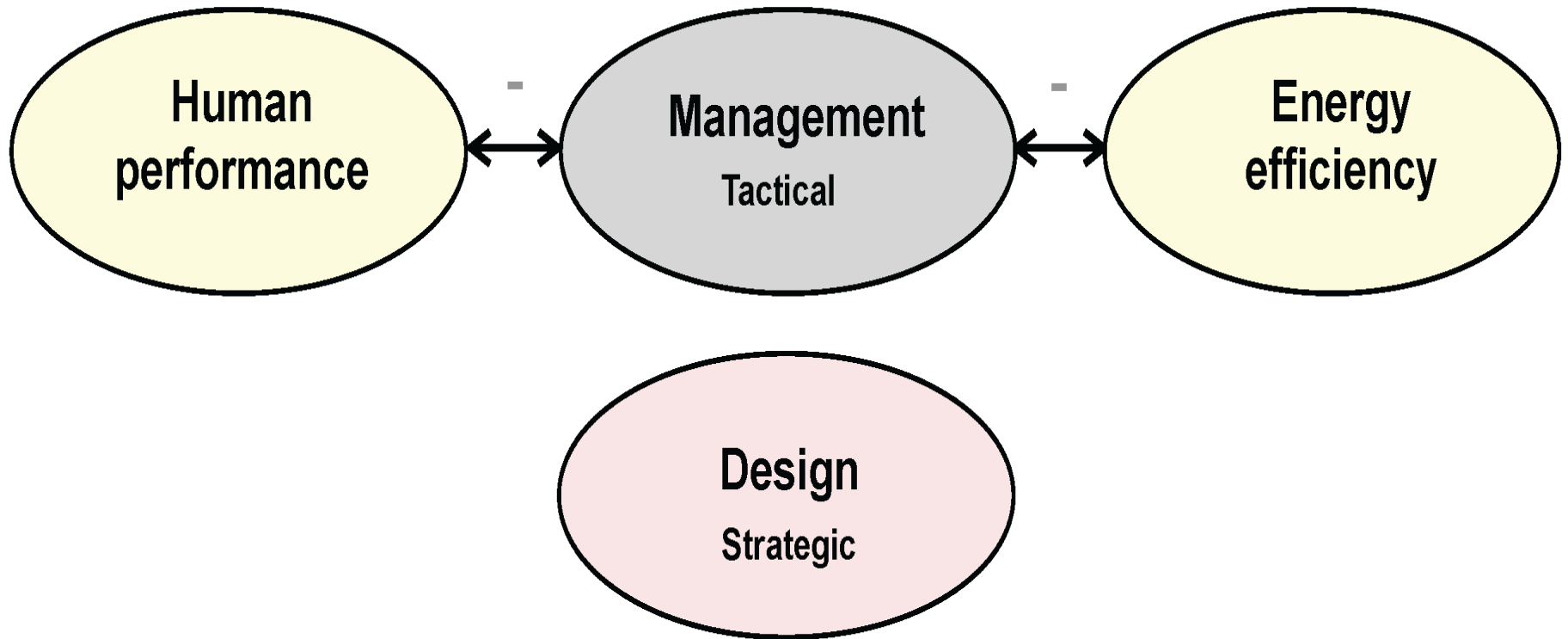
associations of low energy with happy occupants



DESIGN FOR USABILITY AND MANAGEABILITY: In the better-performing buildings, there tended to be better understanding of user requirements during procurement, and better follow-through to good management in use.

One could nearly always name the individual or individuals responsible for championing the building in use and driving the virtuous circles.

... and where they didn't
no positive associations



Without this understanding and commitment - linking design to use and management – performance in use could be disappointing, in terms of energy, occupant satisfaction, and often both. *Need to bring out the leaders.*

What put us on the track (1997) ?

Elizabeth Fry building has the last laugh

The story of the Elizabeth Fry building (AJ 23.4.98) contains a number of ironies. My favourite is that it didn't even make the shortlist of the Green Building of the Year Award in 1996.

DR ROBERT LOWE

Leeds Metropolitan University



LETTER TO ARCHITECTS' JOURNAL

The good performers don't necessarily impress the judges

It was the practice, not just the product

Factors for success at the Elizabeth Fry Building, UEA

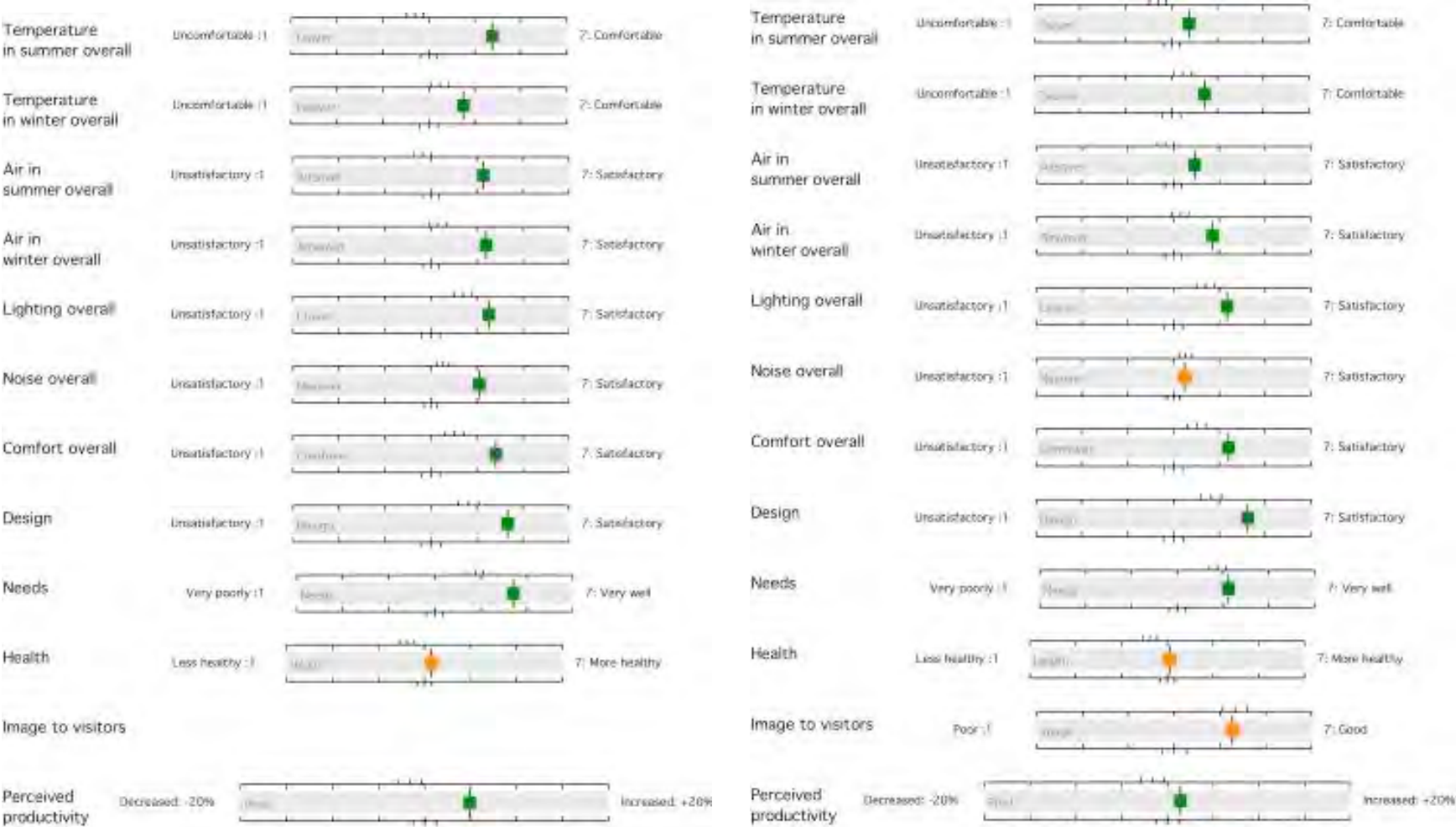
- A good client.
- A good brief.
- A good team *(worked together before on the site).*
- Specialist support *(e.g. on insulation and airtightness).*
- A good, robust design, efficiently serviced *(mostly).*
- Enough time and money *(but to a normal budget).*
- An appropriate specification *(and not too clever).*
- An interested contractor *(with a traditional contract).*
- Well-built *(attention to detail, but still room for improvement).*
- Well controlled *(but only eventually, after monitoring and refit).*
- Post-handover support *(triggered by independent monitoring).*
- Management vigilance *(which has been largely sustained).*

But only its technical features were mentioned when a Royal Commission used it as an exemplar

Elizabeth Fry Revisit - Occupant Survey

1996

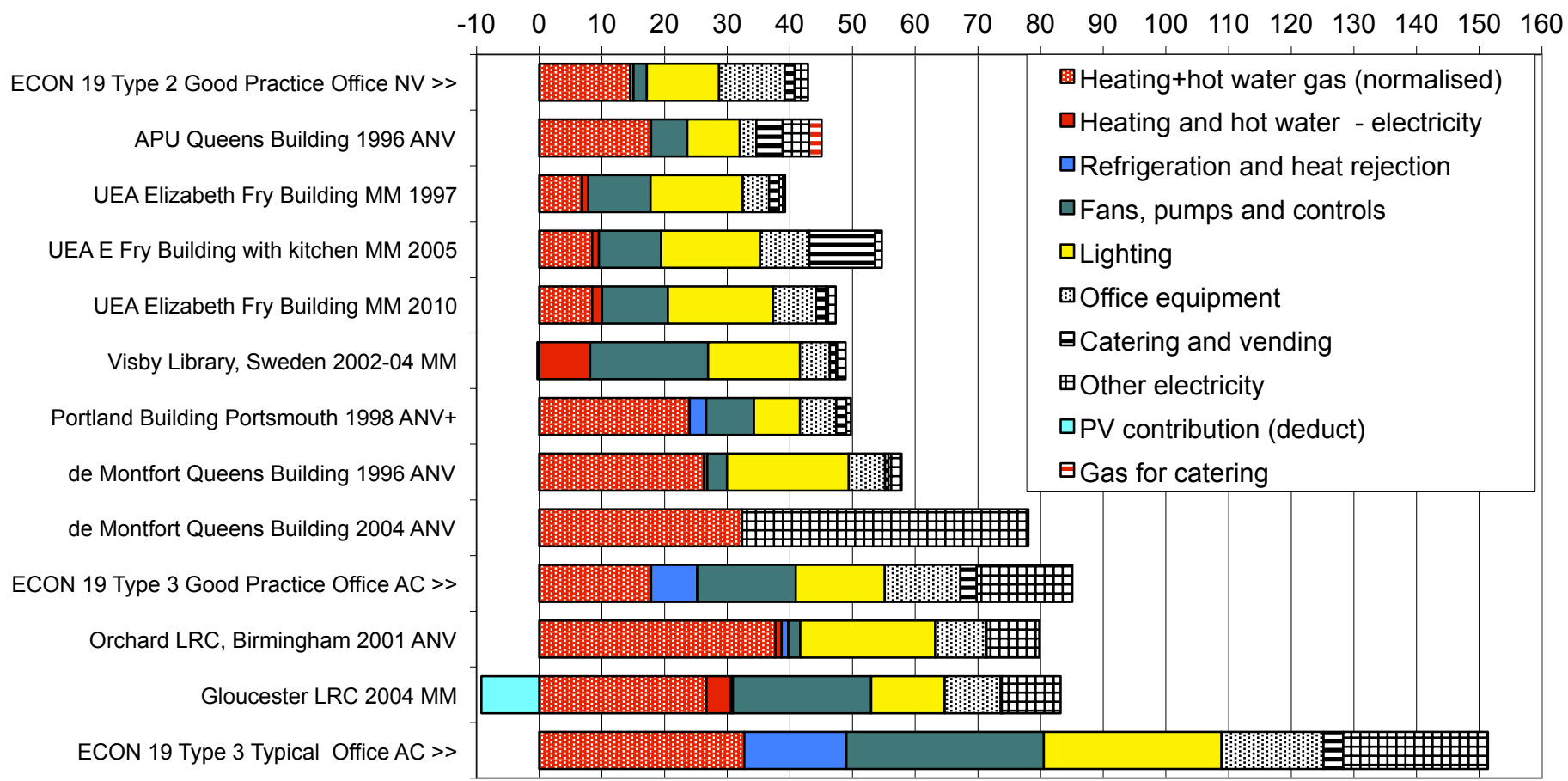
2011



E Fry Revisit – Energy Performance

Annual CO₂ emissions from university buildings

kg/m² Treated Floor Area at UK CO₂ factors of 0.184 for gas and 0.525 for electricity



PART 2

Why do many new buildings not perform as they are supposed to?

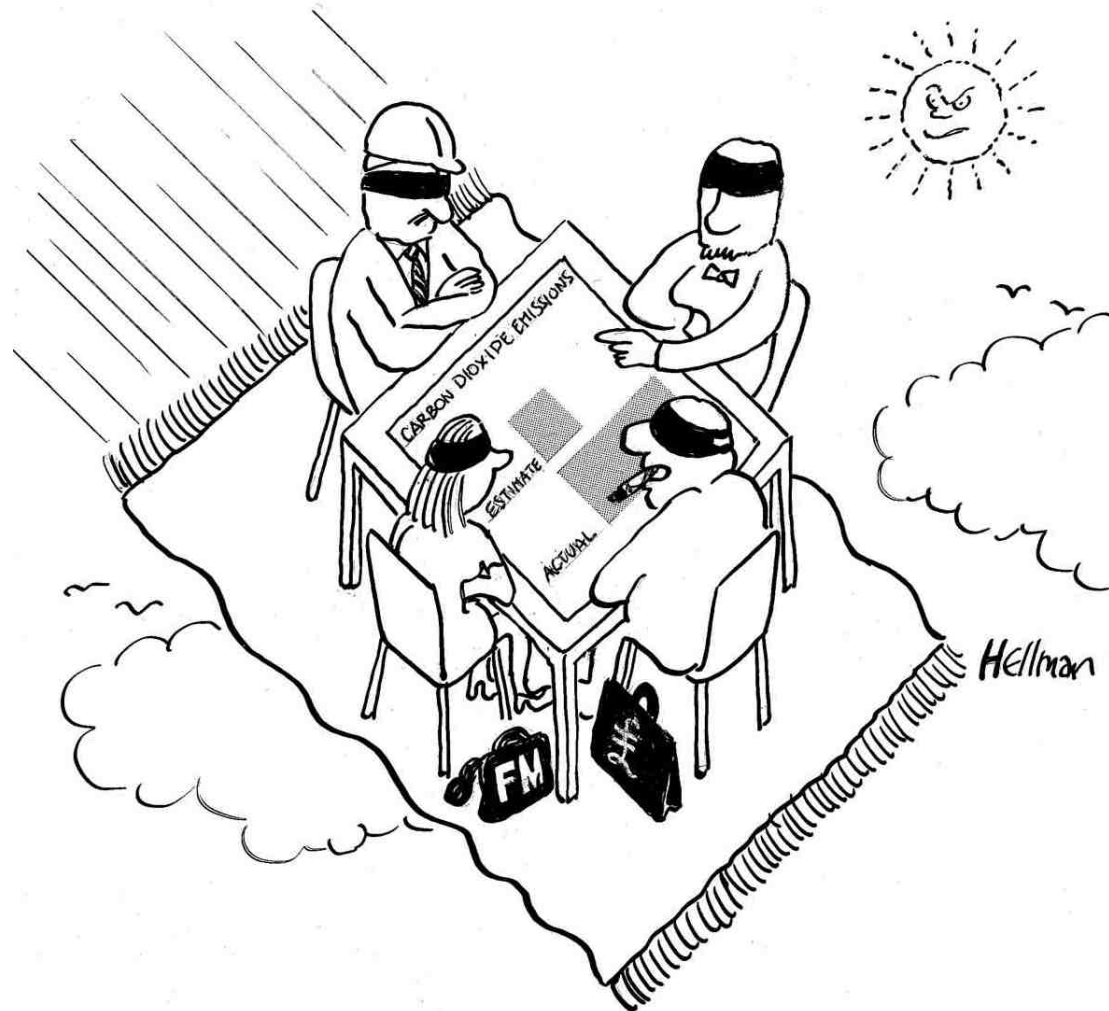
“Clients are the crash-test dummies of the design world” ... SAM CASSELS, *Architecture+Design Scotland*



Crash test observations in the motor industry



Crash test observations in the building industry



What the industry has been missing: *The evidence under our noses*

“in theory, theory and practice are the same, in practice they aren’t”

SANTA FE INSTITUTE for research into complex systems

*“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 Building Research & Information, 2008

*“Architects prefer to learn through direct personal experience.
Engineers prefer principles and established rules.”*

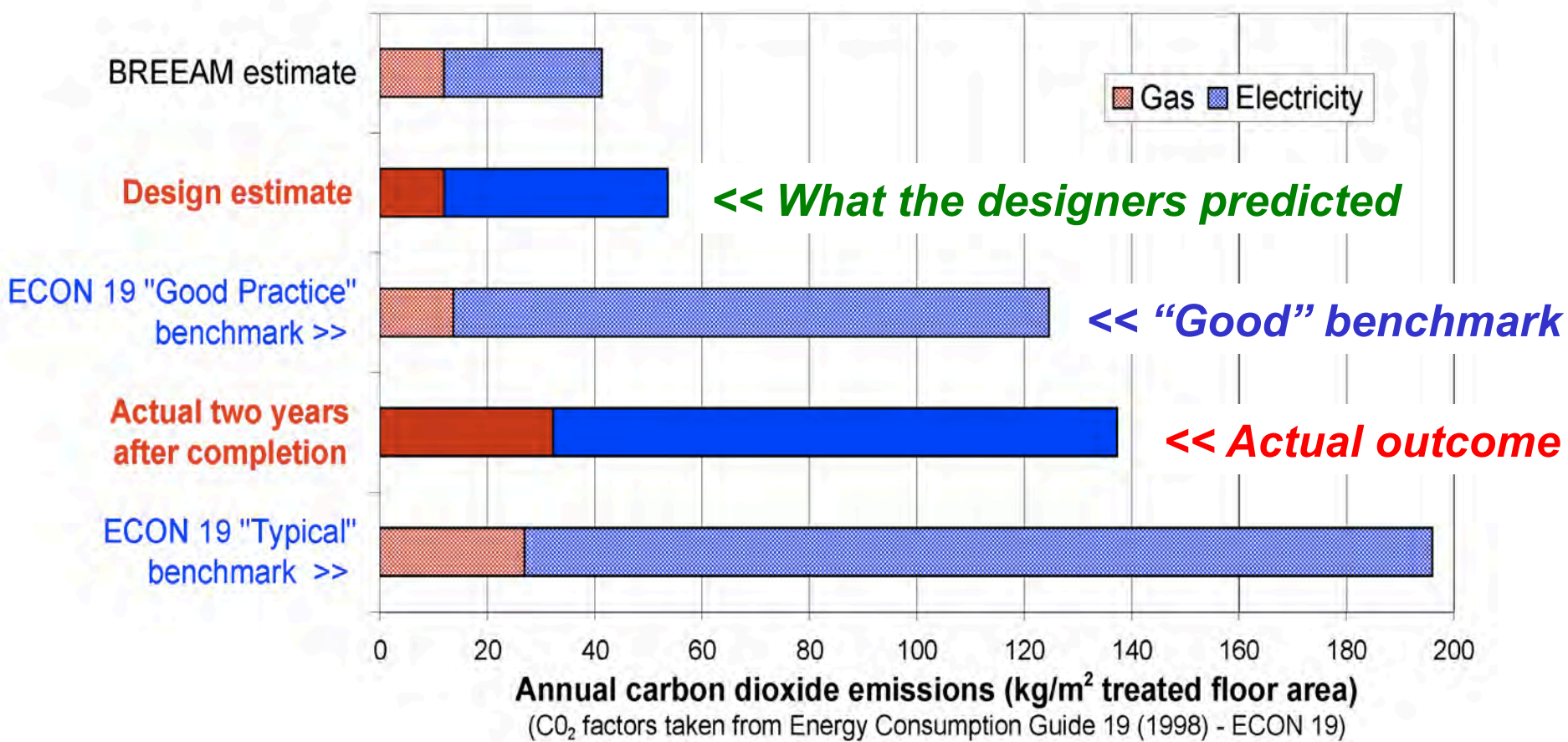
PORTSMOUTH SCHOOL OF ARCHITECTURE: How do we learn?

*“I’ve seen many low-carbon designs,
but hardly any low-carbon buildings”*

ANDY SHEPPARD Arup, 2009

The Design-Performance Gap: *The UK couldn't deliver low-energy performance reliably in the 1990s. It is still difficult.*

Data from the winner of the Green Building of the Year Award 1996



SOURCE: see discussion in S Curwell et al, *Green Building Challenge in the UK*, Building Research+Information **27**(4/5) 286 (1999).

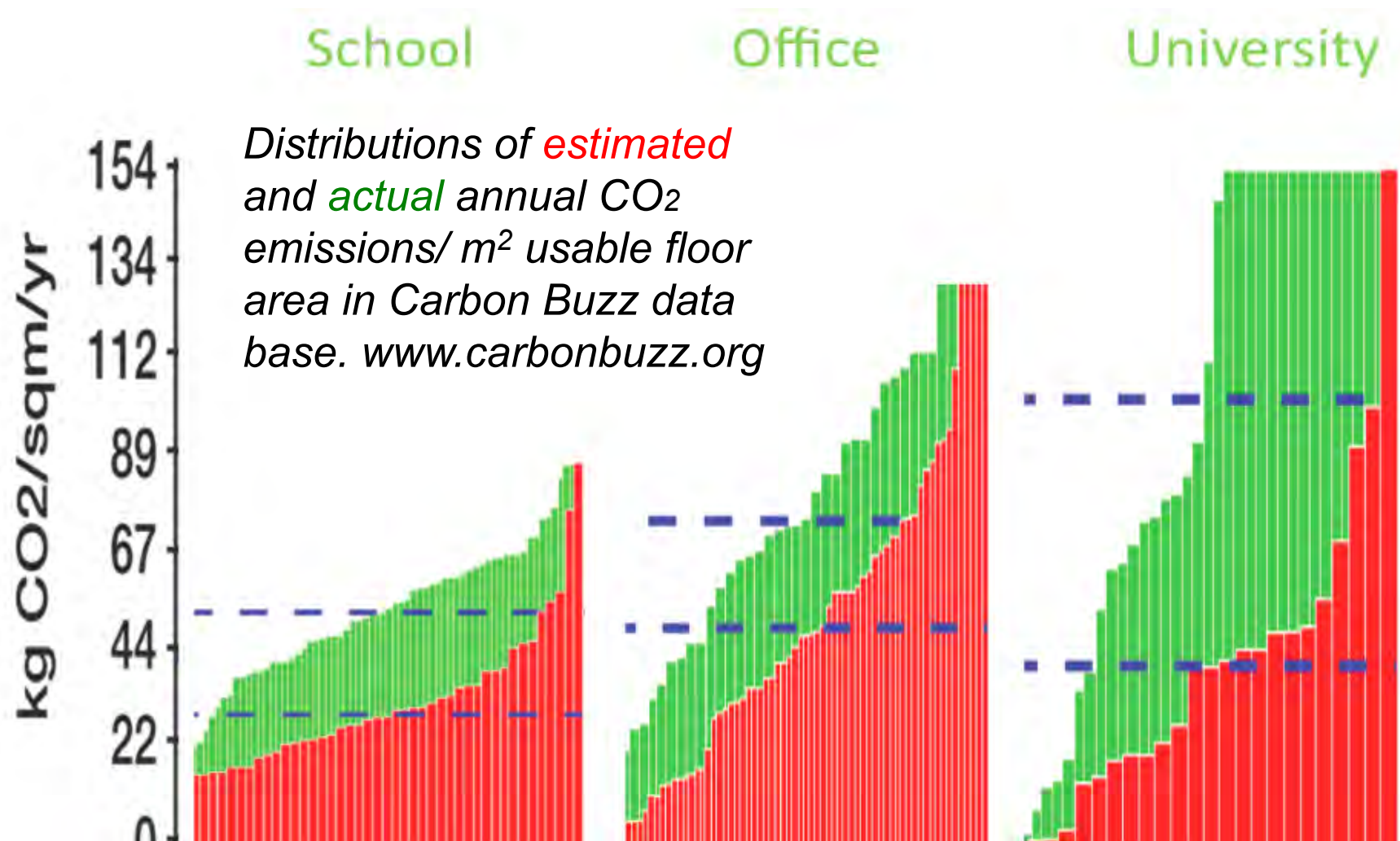
What do we tend to find *when we review performance of recent buildings?*

- They often perform much less well than anticipated, *especially for energy (notably electricity) use, carbon, and occupant satisfaction.*
- Unmanageable complication is the enemy of good performance.
So why are we making buildings more complicated and difficult to manage in the name of sustainability? Prevention is better than cure.
- Design intent is seldom communicated well to users and managers.
Designers and builders tend to go away at handover.
- Buildings are seldom tuned-up properly, and controls are a mess.
So now we have more things to do, what chance do we have?
- Good environmental performance + occupant satisfaction can go hand in hand, *but only where good, committed people have made it happen.*
- Modern procurement systems can make it difficult to do things properly, with enough attention to detail. *Need a new professionalism that engages routinely with outcomes, e.g. using **Soft Landings**.*

**KEEP IT SIMPLE, DO IT WELL, FOLLOW IT THROUGH,
TUNE IT UP, CAPTURE THE FEEDBACK**

The evidence is now overwhelming:

slide from Carbon Buzz Launch June 2013



The gaps occur in new housing too: *a full 40 years after the 1973 oil crisis*

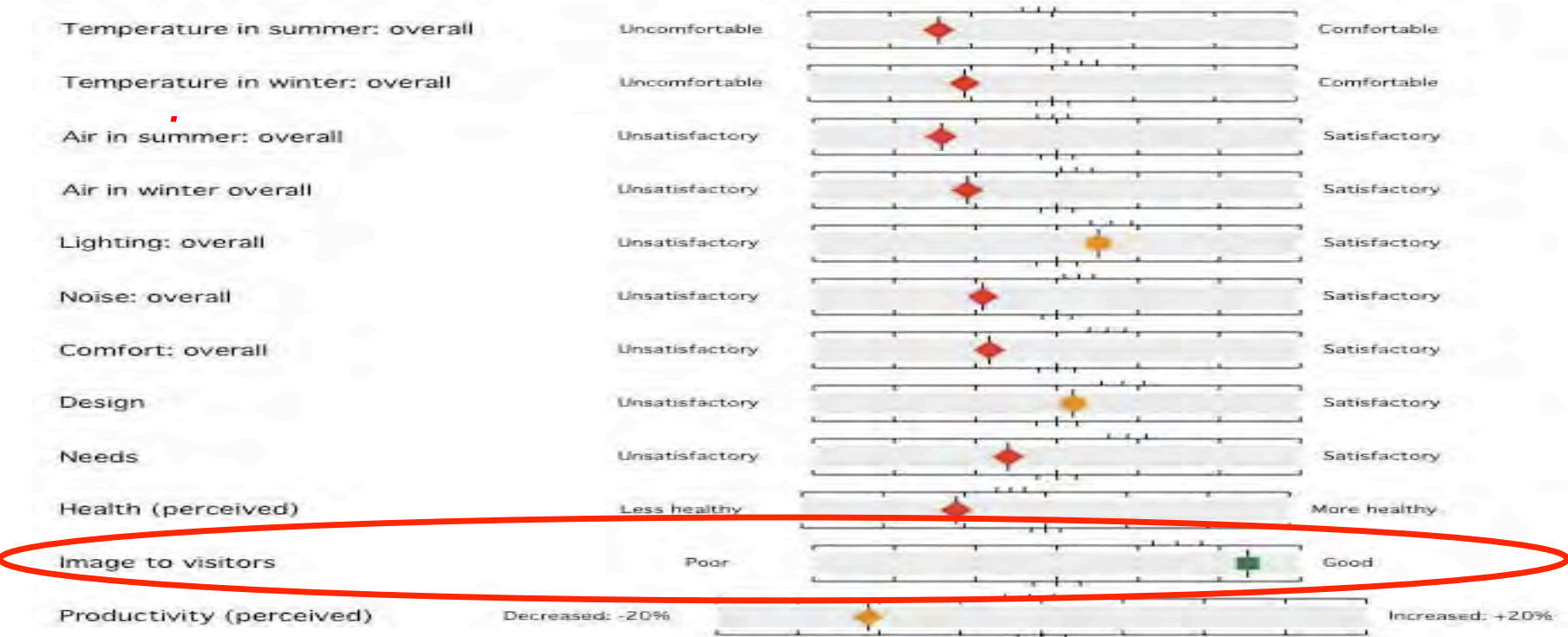
Minister launches Hub-led project to tackle the performance challenge **Ecobuild 6 March 2013**

A new project to examine the energy performance of new homes is unveiled today. The industry-backed project brings together leading housebuilders and industry experts to investigate the actual performance of homes and better understand how this compares to that expected by the original design. Communities and Local Government minister Rt Hon Don Foster MP announced a new £380,000 grant for



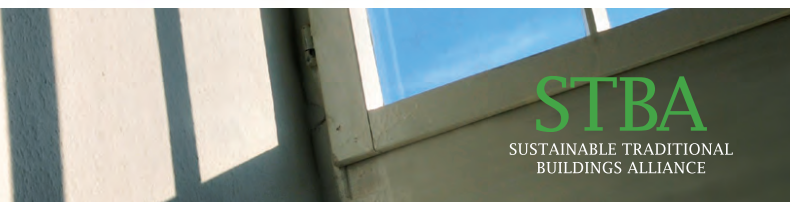
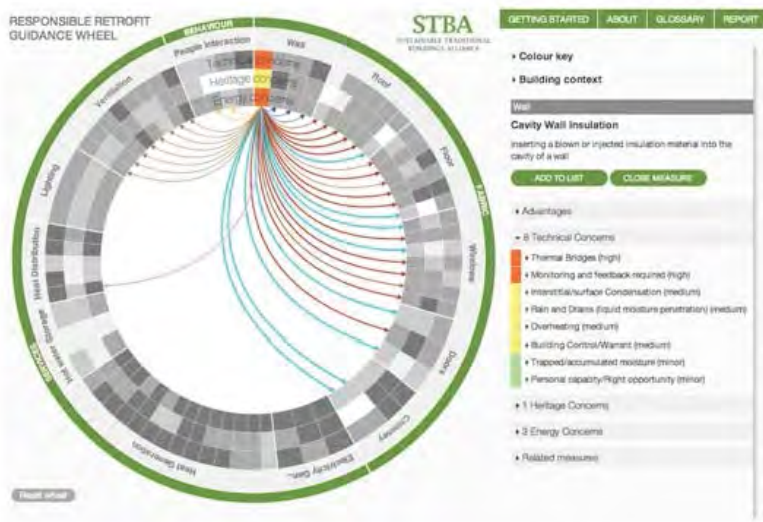
Performance gaps are not just for energy: occupant survey, multi-award-winning school

RED: below average; AMBER: Average; GREEN: Above average



“ ... the architecture showed next to no sense. It leaked in the rain and was intolerably hot in sunlight. Pretty perhaps, sustainable maybe, but practical it is not.” ... STUDENT

The gaps are not just for new buildings: *Knowledge base for retrofit*



SOME CONCLUSIONS

Industry and policy lack understanding of traditional building performance.

Lack of connection between research intelligence and guidance procedures.

Significant uncertainty in application of models and software.

Some methods used are inappropriate.

A systemic approach is necessary to avoid unintended consequences.

There are good opportunities, but some will need to be developed using a rather different basis and structure.

Simple dysfunctions in recent buildings: *Poor window design, leading to overheating*





Wasteful overprovision in new buildings:
In a “low energy” building’s kitchen

... and widely dysfunctional controls



Controls for End Users



Usability criteria	Ranking (controller as supplied)	
	Poor	Excellent
Clarity of purpose	●	
Intuitive switching	●	
Labelling and annotation	●	
Ease of use	■■■■■	
Indication of system response	■■■■■■■■■■	
Degree of fine control	●	



This control for lighting has clear switching with four settings clearly illuminated, plus an off setting. The numbers by the setting are arbitrary.

Apart from the numbering, the switch is not labelled as to what it does. The red light for setting 1 is on the far left of its button, hinting that there be more than one stage for each setting. Is the off button for system off, or does it apply to each of the four stages in turn? Does the vertical button to the right raise or lower the lighting generally, or on each setting? In the absence of clear annotation, the user is forced to experiment.



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Indication of system response	●	
Degree of fine control	■■■■■	

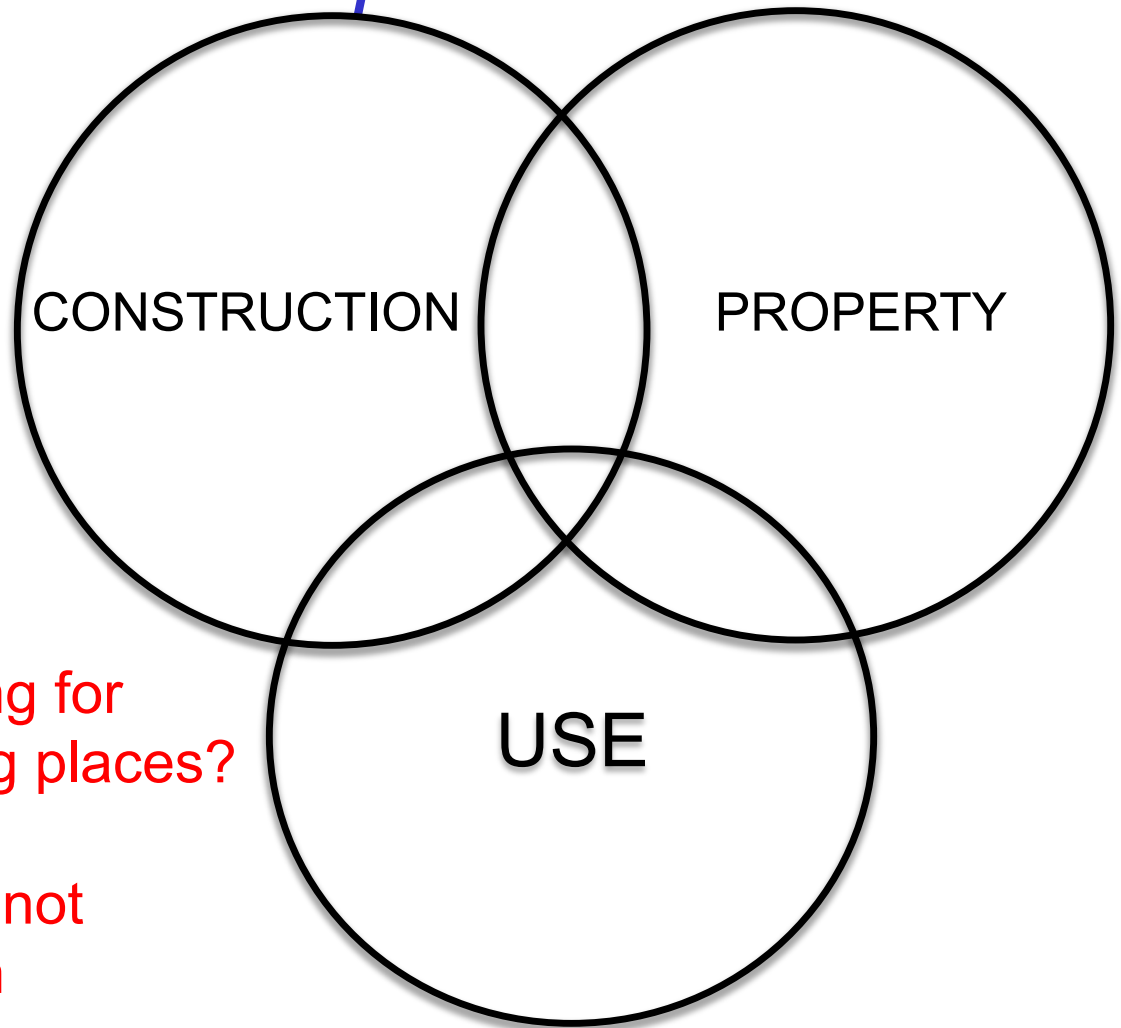
This controller is clearly a control device for ventilation. The knob at the lower left appears to offer control over a setpoint (presumably for temperature), against an arbitrary scale of plus or minus. In the absence of controller feedback, the user would need to learn the settings by experimentation. The function of the knob on the right is clearer, with three fan speed-settings, but is it for room ventilation or a fan in a heating/cooling unit? Probably the latter, as experience has forced the facilities manager to append a label telling users not to switch off the fan.

*“we sell dreams and install nightmares”
– CONTROLS SUPPLIER*

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 tuning-up 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.* Hence BPE.
-

There needs to be more shared territory,
with much more emphasis on use



Do policymakers
really understand this ...

or have they been looking for
the answers in the wrong places?

Performance in use has not
been well represented in
industry and policy measures.

50 years ago in the UK: 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.

A false dawn: What went wrong?

In 1972:

The seminal book *Building Performance* was published by BPRU, the Building Performance Research Unit at Strathclyde University.

The very same year:

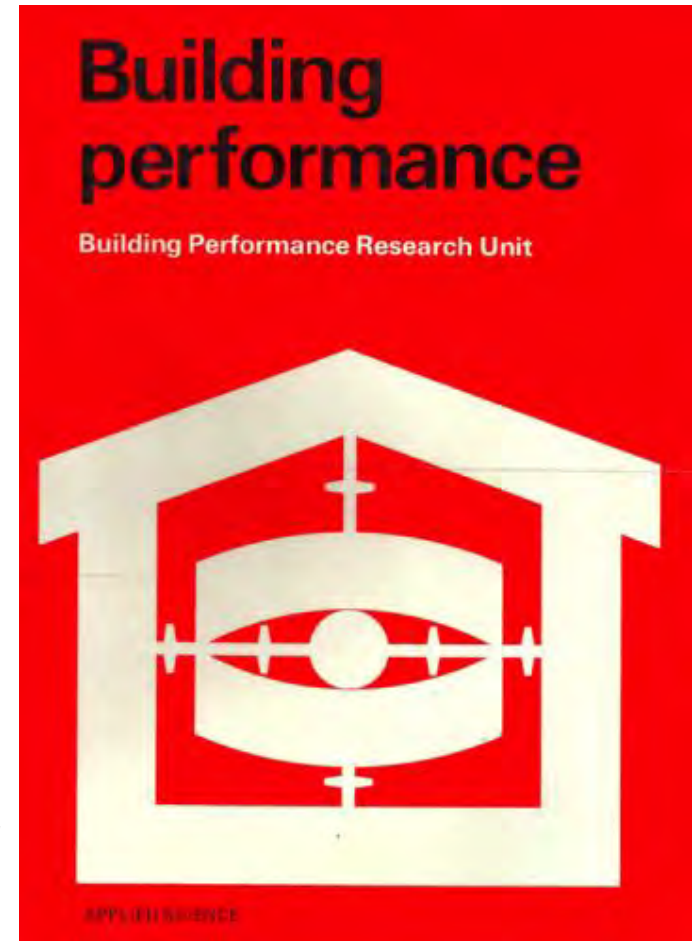
RIBA took STAGE M out of its publication *Architect's Appointment*.

REPORTEDLY BECAUSE:

- *Difficult to define what should be done.*
- *Clients wouldn't pay for it.*
- *RIBA did not want to create the impression architects would do it for nothing.*
- *Concerns about legal and insurance implications.*

FEEDBACK ALSO WITHERED IN ACADEME:

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



the tide also turned in government ...

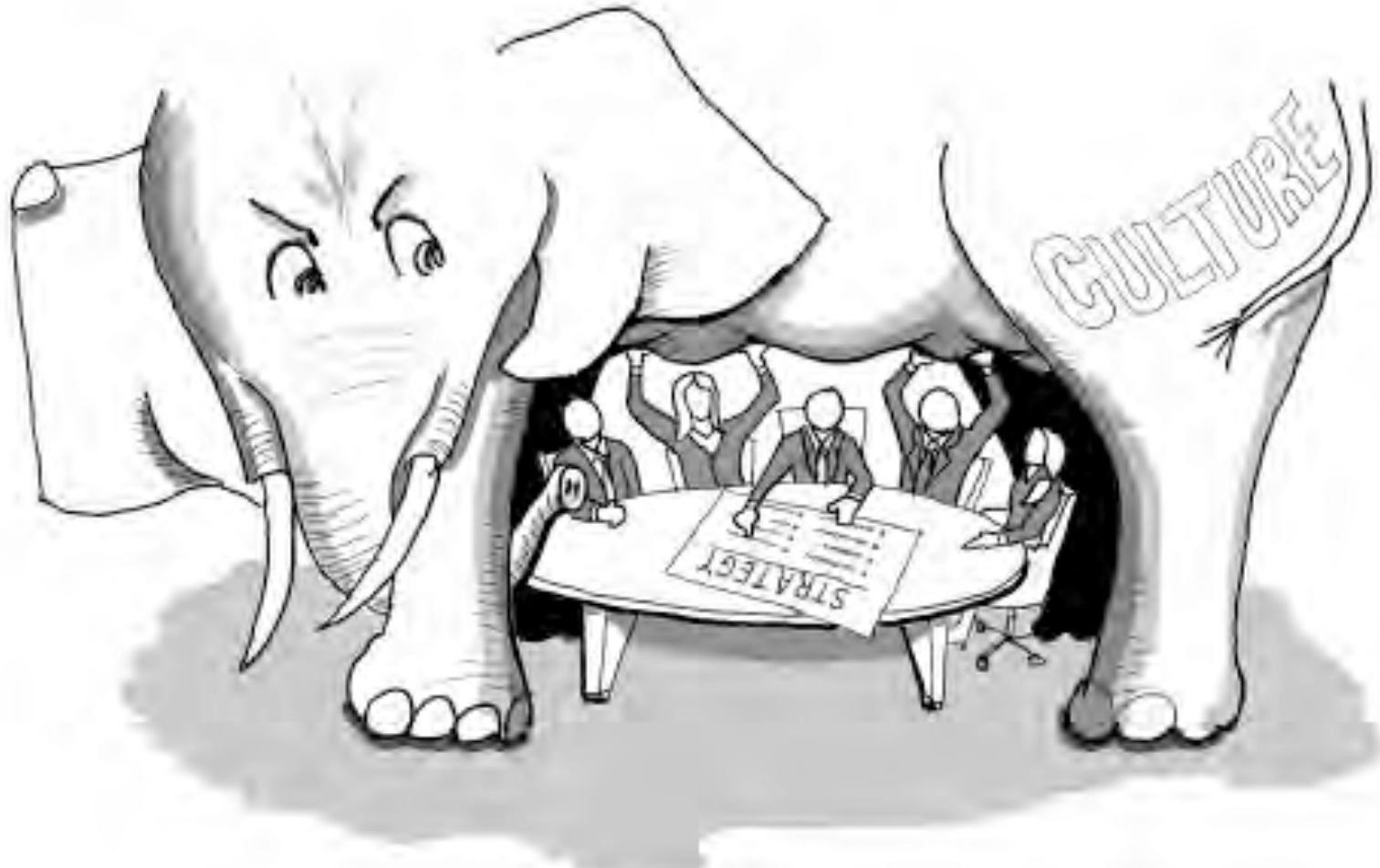
- Widespread disruption and disillusionment in the 1970s.
- Ascendancy of ideas about free markets, competition and choice; a *de facto* inefficient public sector, and “*no such thing as society*”.
- Professionals began to be seen as an elitist conspiracy against the public, and treated by government 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

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



WE HAVE A SYSTEMIC PROBLEM: Blindness to performance in use
It's not just the construction industry, it's the way we all go about things

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

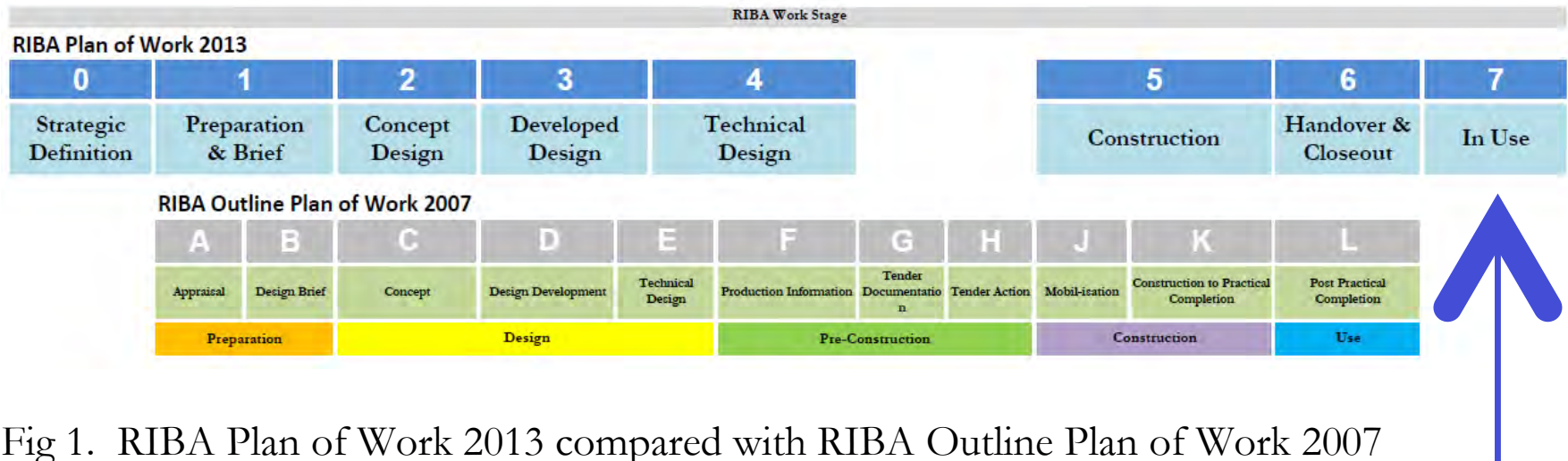


Fig 1. RIBA Plan of Work 2013 compared with RIBA Outline Plan of Work 2007

In your education or in practice, have you evaluated the performance of a building in use?

If not, why not? What's getting in the way?

Probe POEs 1995-2002: *What they found in a review of the first sixteen studies in 1999*

Good buildings, but recurrent problems:

- Interfaces between work packages.
- Control systems, management + user interfaces, system and management responsiveness.
- Handover processes, with insufficient preparation and little follow-through into occupancy.
- User dissatisfaction with environment, noise, and unwanted interruptions.
- Energy use often much higher than anticipated.
- Unmanageable complication, once mostly confined to deep air conditioned buildings, was worryingly migrating into “green” buildings.

Some of the lessons:

Design intent needs to be clear.

Essential features are often absent.

Keep it simple and do it well.

Take account of unintended consequences.

Manage expectations to avoid credibility gaps between expectations and outcomes.



Pay careful
attention to detail



Controls, manageability and usability need much more attention at all stages



“An intelligent building is one that doesn’t make its occupants feel stupid” ... ADRIAN LEAMAN

“We sell dreams and install nightmares” ... BMS SUPPLIER

Don't procure
what you can't afford to manage



Technology - management interactions:

Strategic conclusions from the Probe studies of public and commercial buildings in use

		Technological complexity	
		More	Less
Building management input	More	Type A <div>High Performance</div>	<div>Will ordinary people be able to look after them?</div>
		<div>Big danger, especially for public buildings</div>	<div>Simple Smart</div> <div>Sense and Science</div> <div>Type B</div>

Secure Type A
Seek more Type B
(and possibly Type D)
Avoid Type C -
unmanageable complication.

Big danger,
especially for
public
buildings

Will ordinary people be able to look after them?

Simple Smart

Sense and Science

Type B

In spite of these insights from the 1990s, *complication has burgeoned in recent years*

- Technical complication
- Legislative complication
- Contractual complication
- Bureaucratic complication
- Tick-box procedures: feature creep
- Complication for building users and managers

So less money to spend on basics

The complication disease has now spread to housing too!

AND NOTHING JOINS UP PROPERLY!

“Complexity is profitable, [it] makes people believe you understand it.”

JON DANIELSSON



The disease of unmanageable complication has now spread to domestic buildings

SIGMA HOUSE, BRE *(illustrated)*

- Extensive feedback from occupants, including comfort, ergonomics, space.
- Complicated, confusing and unreliable technologies and renewables.
- Energy use much higher than predicted.

ELMSWELL, ORWELL

- Two-thirds of residents could not programme their thermostats.
- Mechanical ventilation with heat recovery was present, but 95% of people had windows open in winter.
- Design air change was 0.5 to 1 ac/h. One open window could provide 17 ac/h!



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?

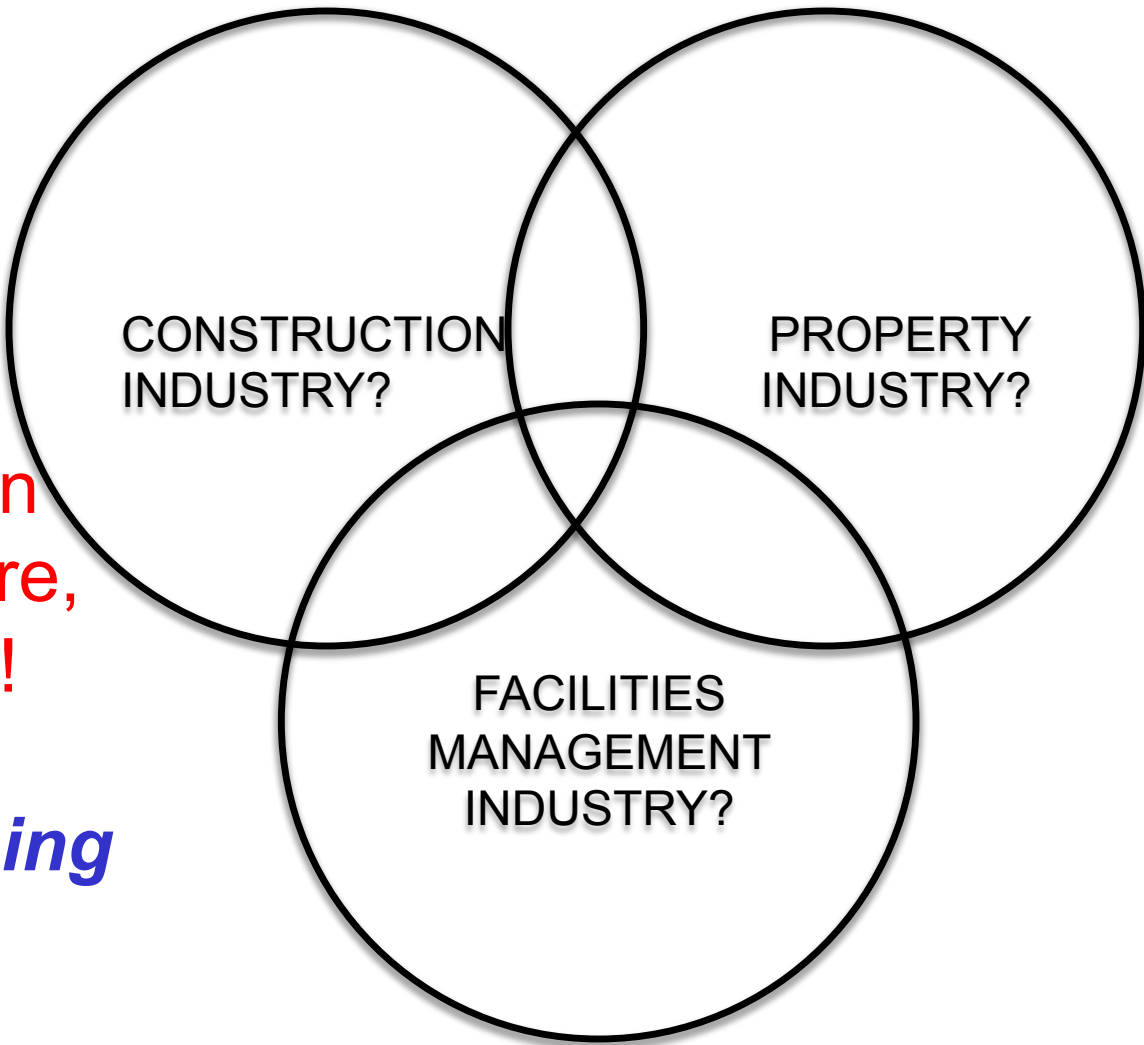
Why is actual performance not the proper target?

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 market failure,
but category error!

*We need something
more ...*



New Professionalism: getting started

Principles anyone can adopt tomorrow



PROVISIONAL LIST DEVELOPED WITH THE EDGE ***ETHICS AND PRACTICE:***

1. Be a steward of the community, its resources, and the planet. Take a broad view.
2. Do the right thing, beyond your obligation to whoever pays your fee.
3. Develop trusting relationships, with open and honest collaboration.

ENGAGEMENT WITH OUTCOMES:

4. Bridge between design, project implementation, and use. Concentrate on the outcomes.
5. Don't walk away.
Provide follow-through and aftercare.
6. Evaluate and reflect upon the performance in use of your work. Feed back the findings.
7. Learn from your actions and admit your mistakes. Share your understanding openly.

THE WIDER CONTEXT:

8. Seek to bring together practice, industry, education, research and policymaking.
9. Challenge assumptions and standards. Be honest about what you don't know.
10. Understand contexts and constraints. Create lasting value. Keep options open for the future.

New Professionalism: recent progress

Morrell report for Edge published May 2015

The report focuses largely on the role of the institutions: **Top Down**.

Key themes: *Ethics, Education, Knowledge, Collaboration.*

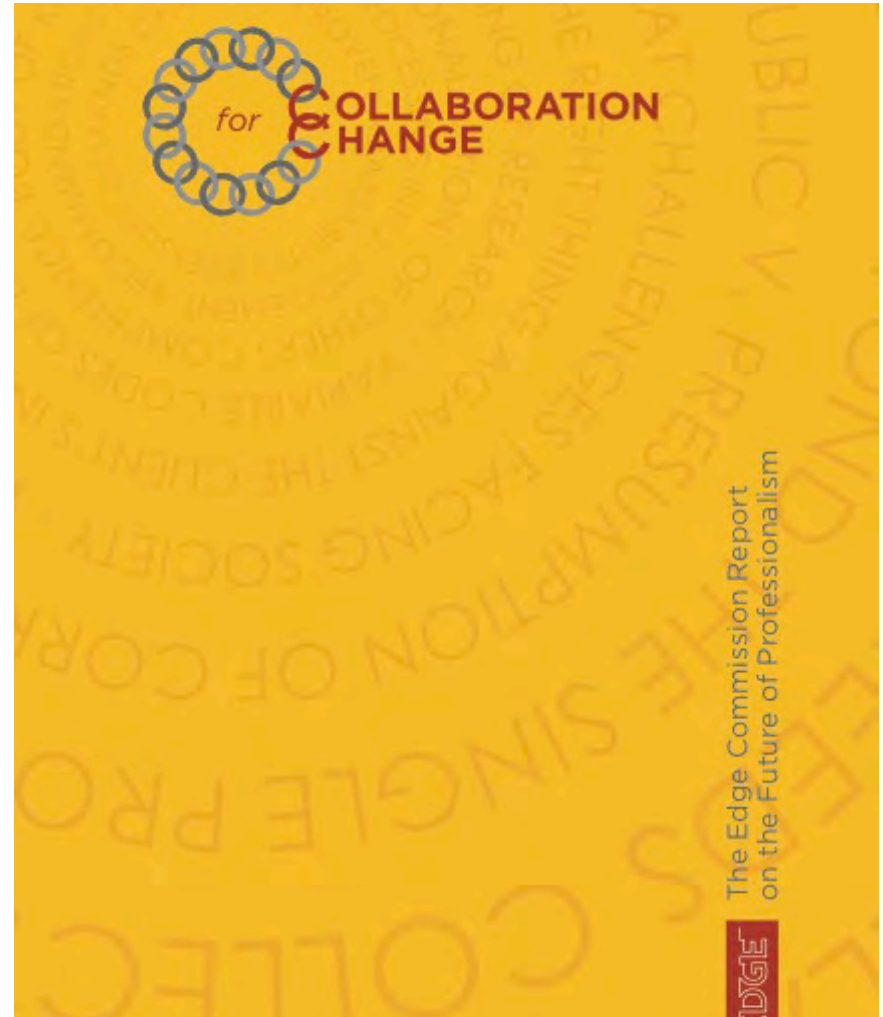
Two complementary approaches, that can help gather momentum:

Bottom-up:

The individual,
e.g. adopting the ten points.

Middle-out:

At organisational and practice level.



New Professionalism: *What do you think?*

ETHICS AND PRACTICE:

1. Be a steward of the community, its resources, and the planet. Take a broad view.
2. Do the right thing, beyond your obligation to whoever pays your fee.
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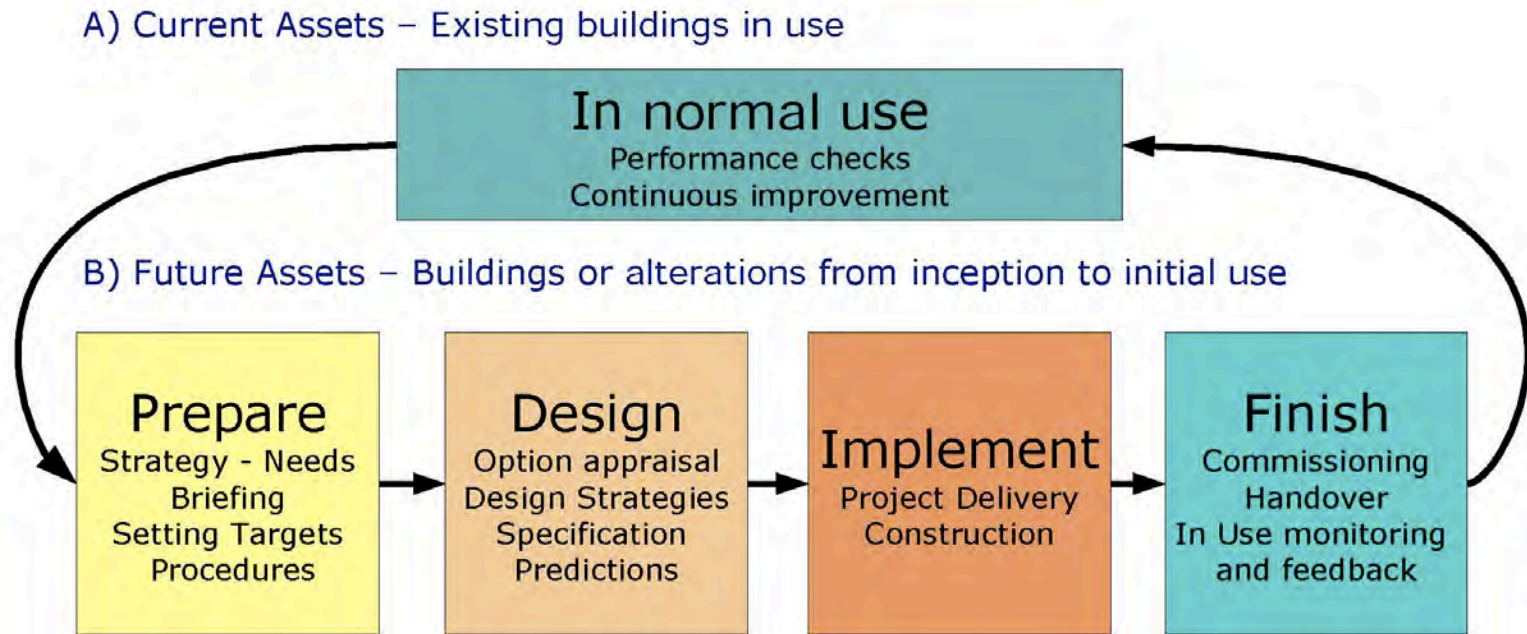
8. Seek to bring together practice, industry, education, research and policymaking.
9. Challenge assumptions and standards. Be honest about what you don't know.
10. Understand contexts and constraints. Create lasting value.
Keep options open for the future.

DISCUSSION

PART 3

**Changing our ways:
a focus on outcomes,
with *Soft Landings***

THE FUTURE: *Closing the loop, making follow-through and feedback routine*



You can use feedback at any stage in the life cycle of a building or project

HINDSIGHT: After you've completed a project (*learning and fine tuning*)

FORESIGHT: Before you do something new (*existing situation + analogues*)

INSIGHT: At any time (*reality checking, managing expectations*).

*Good processes need to bring it all together, and reinforce the **Finish** stage*

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 OF BUILDINGS IN USE

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*

Getting more sense into procurement

Soft Landings can help

- 1. Inception and Briefing**
*Appropriate processes, better relationships.
Assigned responsibilities, including client.
Well-informed targets related to outcomes.*
- 2. Design and construction**
Including expectations management.
- 3. Preparation for handover**
Better operational readiness.
- 4. Initial aftercare**
*Information, troubleshooting, liaison,
fine tuning, training.*
- 5. Longer-term aftercare**
*monitoring, review, independent POE,
feedback and feedforward.*

Can run alongside any construction process



Soft Landings Stage 1:

Inception and briefing

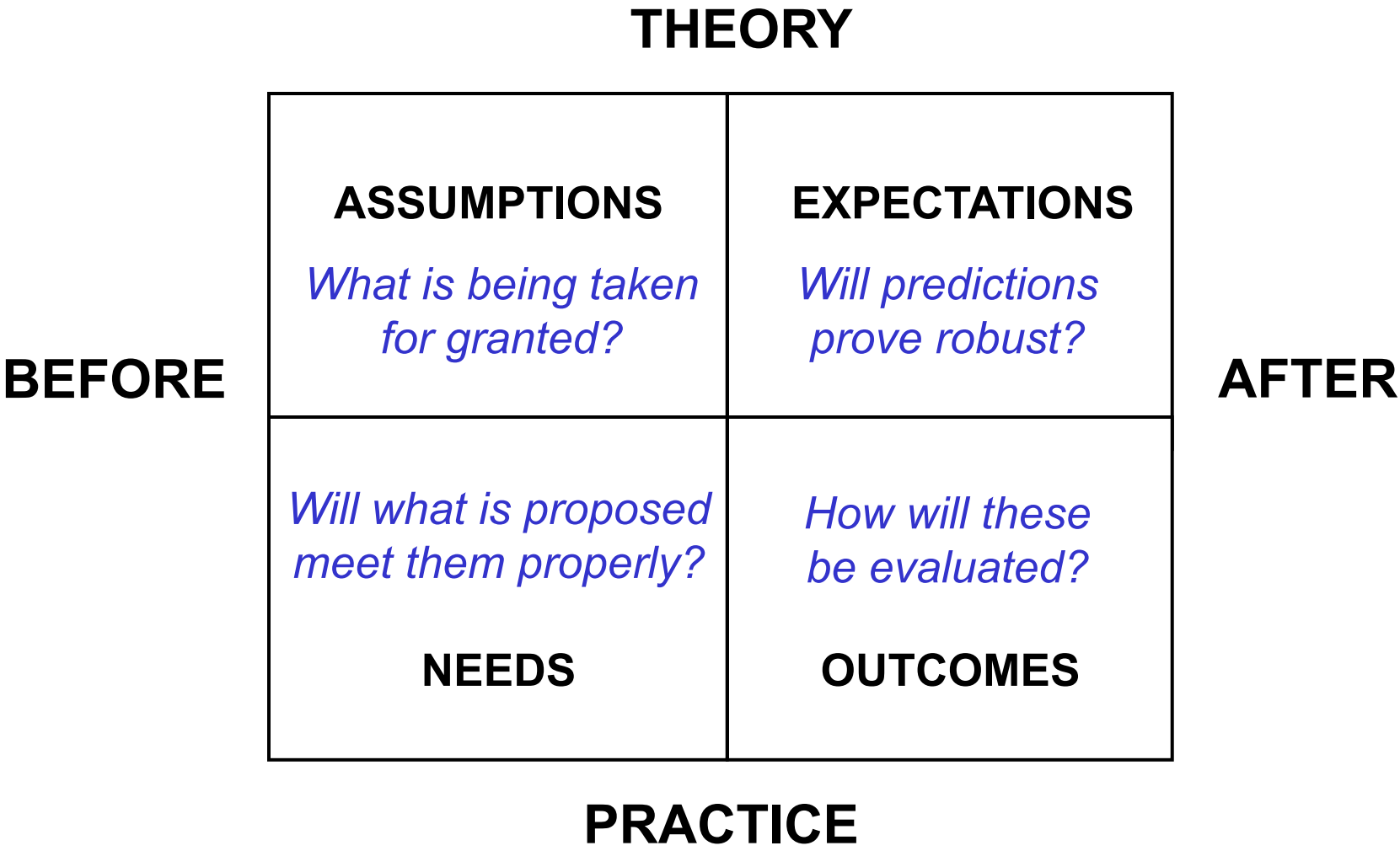
The most important stage, because it binds the team and sets the whole style of engagement with outcomes.

- However, clients have been reluctant to pay, thinking that the industry ought to be doing it anyway.
- Modern procurement methods have often salami-sliced things, making it difficult to maintain *the golden thread* of maintaining and refining design intent throughout a project and on into use.
- *Some clients are writing it into their briefs.*
- *Some PFI teams are starting to put it into their bids.*
- *Some designers want it to be in their standard service.*
- *May become mandatory for government projects from 2016.*

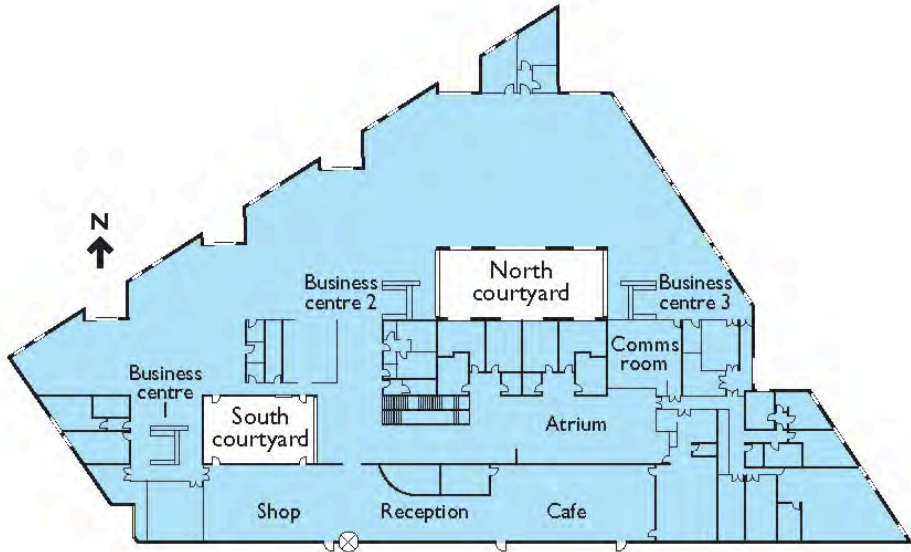
FEEDBACK:

The project team should select a **Soft Landings Champion** or Champions, who can provide the leadership to help things along ... **these are in effect the new professionals.**

Four aspects of briefing: *if poorly managed, don't be surprised if there are large performance gaps*



Early example by research team members: *National Trust Heelis Building, Swindon*



Scheme design by Feilden Clegg Bradley Studios (architects), Max Fordham (building services), Adams Kara Taylor (structural).

Soft Landings Stage 2:

Reviews during design and construction

- Set stretching but realistic expectations, *not pie-in-the-sky*.
- Manage them through the process.
- Undertake regular reviews and reality checks.
- Leave elbow room: *this is systemic improvement, not exact science*.

FEEDBACK:

- Any costs up to handover can usually be met by efficiency gains, *though there may be a learning curve to pay for*.
- Soft Landings Champion(s) can provide leadership, maintain the emphasis on outcomes, and remind project managers that it is not enough just to keep to time and budget.
- This must all be done in the spirit of learning, not blaming.

Soft Landings research team members Feilden Clegg Bradley and Max Fordham use an expectations management process, e.g. on the National Trust's Heelis building in Swindon.

Expectations Management:

Sustainability matrix approach used at Heelis

Sustainability Matrix: Offices

Feilden Clegg Bradley Architects LLP ©

Operational Energy Consumption and CO² Emissions

	1. GOOD PRACTICE	2. BEST PRACTICE	3. INNOVATIVE	4. PIONEERING	NOTES
1. CO ² Emission Target	40kgCO ² /m ² /yr	30kgCO ² /m ² /yr	15kgCO ² /m ² /yr	"Carbon neutral" 0kgCO ² /m	Industry standard EEO targets
2. Heating Load Target	79kWhr/m ² /yr	47kWhr/m ² /yr	30kWhr/m ² /yr	20kWhr/m ² /yr	Industry standard EEO targets
3. Electrical Load Target	54kWhr/m ² /yr	43kWhr/m ² /yr	35kWhr/m ² /yr	25kWhr/m ² /yr	Industry standard EEO targets
4. U Values:					
Wall	0.35	0.25	0.2	0.1	good practice=current
Average Window	2.2	1.8	1.4	0.9	building regulations
Roof	0.2	0.18	0.15	0.1	pioneering=Bedzed values
Ground Floor	0.25	0.22	0.2	0.1	
5. Airtightness	<10m ³ /hr/m ²	<8m ³ /hr/m ²	<5m ³ /hr/m ²	<3m ³ /hr/m ²	All measures require careful attention to details and monitoring construction.
6. Ventilation	Natural ventilation where possible. Mechanical ventilation where not.	Designed natural ventilation with automatic openers, mechanical ventilation to WCs etc.	Mechanical ventilation with heat reclaim in winter and BMS controlled natural ventilation in summer.		BMS with manual overrides preferable on all windows.
7. On Site Energy Generation		Solar domestic water heating to WCs.	Solar domestic water heating to WC cores. Cost effective PV installation using PVs to shade rooflights. Gas fired CHP installation.	Solar water heating to kitchens. Maximum PV installation using most efficient PVs. Wood/waste fired CHP.	Potential 50% grant available from DTI for wolar water heating, up to 65% for PV installation.
8. Daylighting	"Reasonable" to BS8206 part 2. A 2% daylight factor.	80% office space daylight to meet criteria of BS8206: part 2.	100% of office space daylight to BS8206 part 2		Ensure prevention of solar heat gain/glare by building form/shading systems
9. Artificial Lighting Controls	PIR detectors in WCs etc. Low energy fittings throughout.	Luminance and presence detectors throughout building. No dimming.	Luminance and presence detection at all fittings with dimming to zero and BMS override.		Personalised controls strongly recommended by Rob Jarman
10. Cooling Systems/Sources	Zero ozone depletion refrigerants in high efficiency comfort cooling/air conditioning systems.	Night time structural cooling with automatic window vents.	Evaporative cooling to rooms with high internal heat gains.	Borehole/ground water cooling to rooms with high internal heat gains.	Need to provide for areas where cooling is required and provide upgrade path for entire building.
11. Embodied Energy in Structural Materials	Steel and concrete frame engineered to minimise mass of materials.	Use of cement replacements eg GGBFS in concrete. Use recycled steel.	Timber structure in lieu of steel or concrete but retaining concrete floors. Use of recycled aggregates in structural concrete.	All timber structure with thermal mass provided using minimum amount of concrete.	NB. Rob Jarman particularly keen on use of timber for low embodied energy

Soft Landings Stage 3:

Preparation for handover

- **A change in concept:** Handover becomes an event within an extended *Finish* stage, not the point at which the design and building team sign off and walk away.
- **Preparation for operational readiness** includes not just the static and dynamic commissioning of the fabric and building services, but much closer engagement with the occupier's move-in and their management and maintenance team, *if they have one*.
- **Preparation for aftercare**, with representatives of the design and building team on site after handover. *The time allocation depends on the size and complexity of the project - it might be one person for half a day a week or less, or much more.*
- **If there is unfinished business**, e.g. owing to a forced early handover, then the *golden thread* is easily carried through into STAGE 4: initial aftercare and fine tuning.

FEEDBACK: Early appointment of a facilities management team is not enough, they also need to be brought into the process deliberately.

Soft Landings Stage 3:

Preparation for handover

Section 3: Operating and Maintenance Instructions

CRITERION 5 – PROVIDING INFORMATION

82 In accordance with Requirement L1(c), the owner of the building should be provided with sufficient information about the building, the *fixed building services* and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and power than is reasonable in the circumstances.

Building log-book

83 A way of showing compliance would be to produce information following the guidance in CIBSE TM31 Building Logbook Toolkit³². The information should be presented in templates as or similar to those in the TM. The information could draw on or refer to information available as part of other documentation, such as the Operation and Maintenance Manuals and the Health and Safety file required by the CDM Regulations.

84 The data used to calculate the *TER* and the *BER* should be included in the log-book.

It would also be sensible to retain an electronic copy of the input file for the energy calculation to facilitate any future analysis that may be required by the owner when altering or improving the building.

Do not remove from: *Post room*

Building Log Book

Facilities manager to complete green italic sections

Building Log Book

New Central Offices for the National Trust

Heelis
Kemble Drive
Swindon
Wilts
SN2 2NA
tel: 0870 242 6620

Building owner
National Trust

Facilities manager responsible for log-book: *Liz Adams* Signed:

Emergency contact details

This building log book was prepared by Max Fordham LLP,
42-43 Gloucester Crescent,
Camden, London.
Tel 0207 267 5161.
email - post@maxfordham.com

Log book version: 1 Date: 02/08/2005

This building log book is analogous to a car handbook, providing the facilities manager with easily understood information about how the building is intended to work. It also allows ongoing building energy performance and major alterations to be recorded.

Please ensure that this log book is kept up-to-date and in a readily accessible (designated) position, e.g. in the main building operations room. It contains important information for anyone carrying out work on the building and its services.

This log book is to be kept at all times in: *Post room.*

Electronic version is kept at: Server/PC directory name and file name

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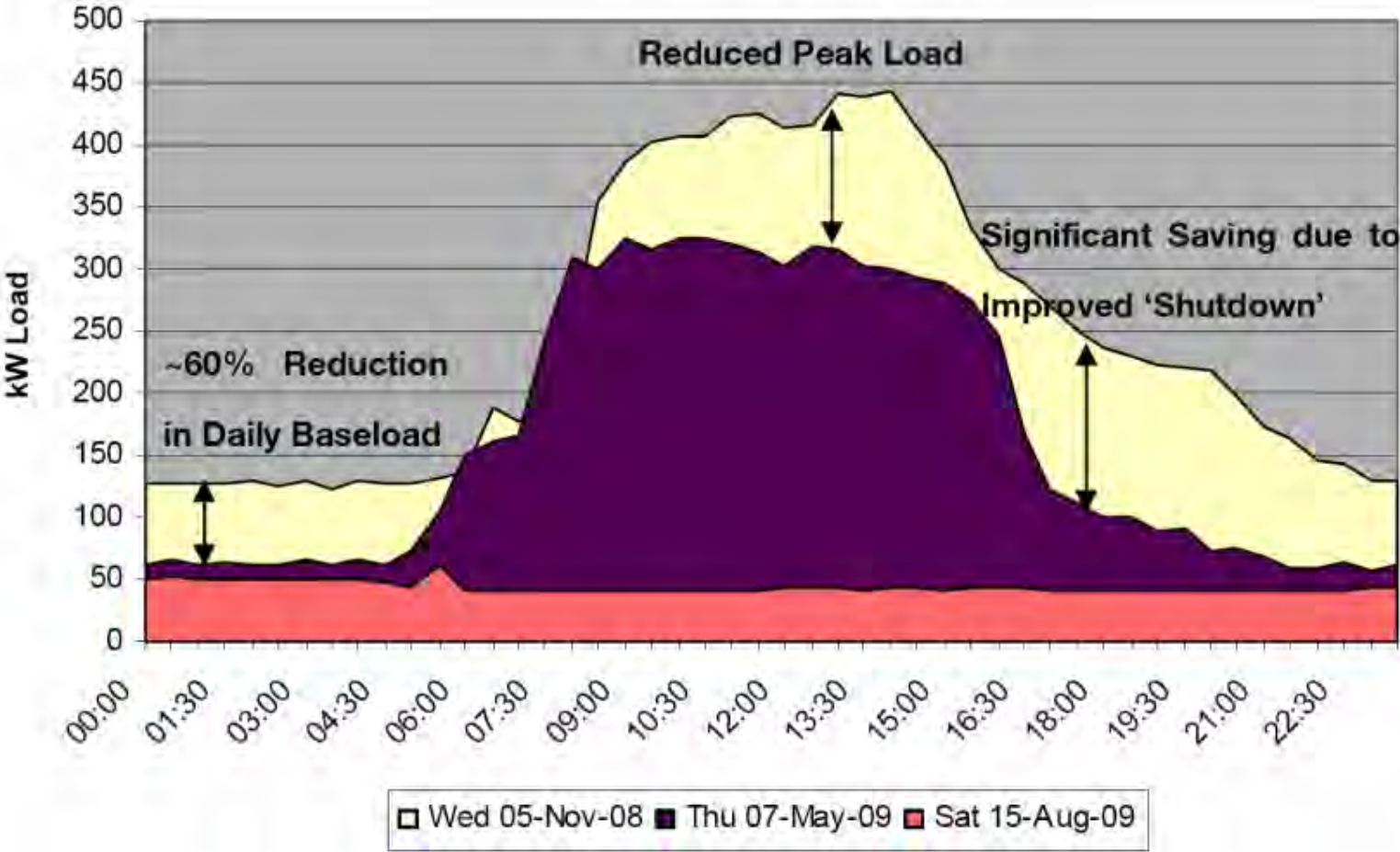
Soft Landings Stage 4:

Initial aftercare

- **Design and building team members visit regularly:** *who and how many visits will depend on project.*
- **They need a home in the building where they are visible to occupants,** *not be hiding in the site hut.*
- **They explain the building to the users,** *in simple guides and in one or two introductory events.*
- **They help the management to take ownership,** *the occupier must take the initiative, not stand back.*
- **They keep people informed,** *e.g. via a newsletter on the organisation's website, e.g. alerting to any problems.*
- **Troubleshooting and fine tuning can be undertaken,** *the best insights have been where the soft landings team does some of its own work in the building and experiences its facilities.*

FEEDBACK: Will contractors engage properly? *Soft Landings priorities are very different from dealing with snags and defects.*

Stage 4 aftercare may pay for itself: *Intervention in a new secondary school*

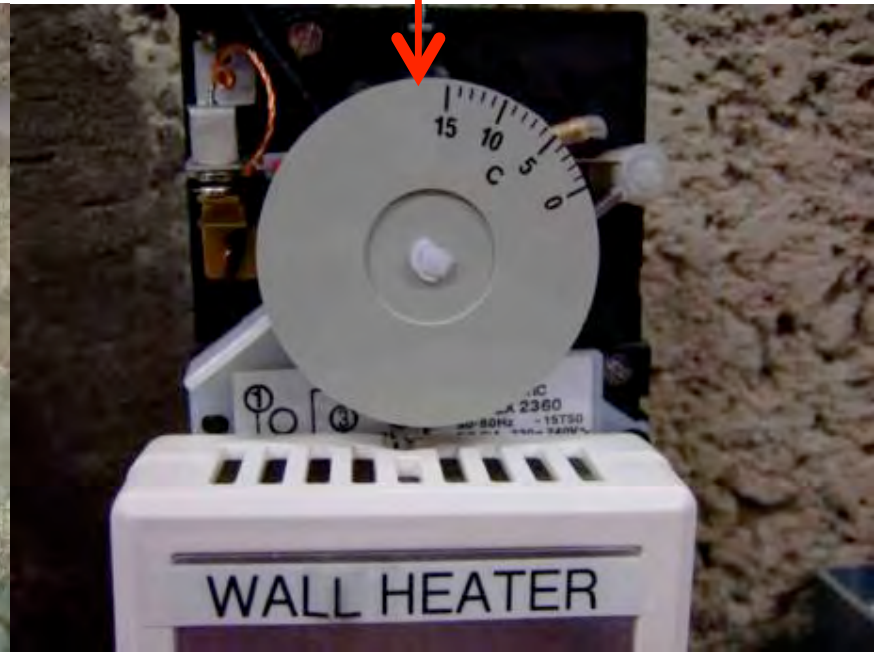


*Saving over £ 50,000 p.a. in electricity bills: **avoiding default to ON** ... and occupant satisfaction will often improve too!*

SOURCE: Buro Happold Engineers, Soft Landings Trials (2009).

Stages 4+5 can trap unintended consequences:

Example: sprinkler frost protection in a primary school



In 2008-09, this frost thermostat (*improperly set at 17°C on installation*) energised the wall heater in the sprinkler pump room. Over a year, this wasted more electricity than the wind generator (*intended to offset the entire building's annual heating energy use*) produced.

Soft Landings Stage 5:

Monitoring, evaluation and feedback

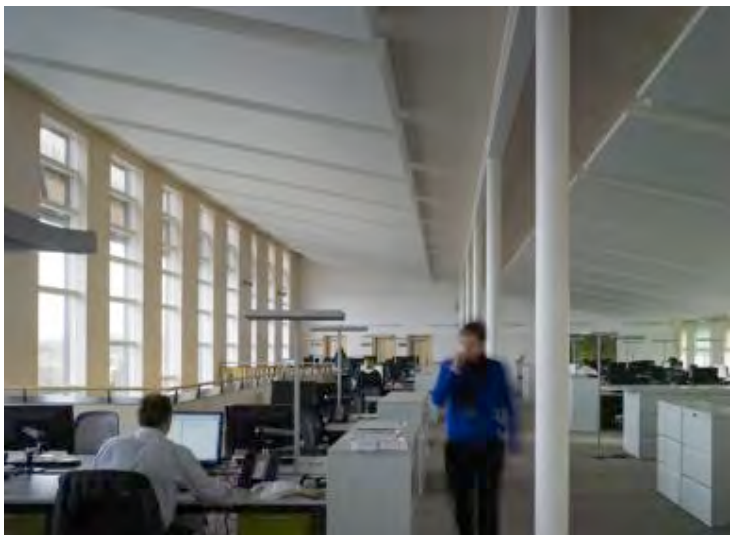
- **Extended aftercare period**, typically two or three years.
- **Occupiers must take ownership** and do most of the monitoring themselves. *They may need motivating.*
- **Independent post-occupancy evaluation can be included**, e.g. for occupant surveys, energy analysis, and structured discussions. *Independent review & benchmarking can be helpful and reassuring.*
- **The findings can be fed through rapidly**, e.g. *to fine tune the systems, refine use and operation of the building and plan upgrades.*
- **The learning can also be spread much more widely**, via the people and organisations involved, and beyond.

FEEDBACK: Often this has needed external funding.

How can we make it routine? The value that can be added is enormous.

We can't afford not to do it; and it can be done with a light touch.

Feeding forward between projects: *National Trust to Woodland Trust*



Soft Landings: *Everybody can win*

- Better communication, proper expectations management, *fewer nasty surprises*.
- More effective building readiness. *Less rework*.
- Natural route for feedback and Post-occupancy evaluation, *to improve the product and its performance in use*.
- Teams can develop reputations for customer service and performance delivery, *building relationships, retaining customers, commercial advantage*.
- Vital if we are to progress towards more sustainable, low-energy, low-carbon, well-liked buildings and refurbishments, *closing the credibility gaps*.

SO WHAT IS STOPPING US?

- **ATTITUDES:** *Everybody needs to be committed, starting with the client - perhaps the biggest obstacle. The “golden thread” needs to be put in place.*
 - **PROCESSES:** *There is a learning curve to pay for (probably best from marketing budgets), and the feedback has to be managed.*
 - **TECHNIQUES:** *Independent POE surveys cost money (but not much).*
 - **CAPACITY:** *We need facilitators, investigators, troubleshooters and fixers.*
 - **MONEY:** *Particularly allocation for tune-up etc. after practical completion.*
 - **IMAGINATION:** *Often constrained by burgeoning bureaucracy!*
-

SOFT LANDINGS FOR SCHOOLS

Case Studies



Feedback from use
of the Soft Landings
Framework in new
schools

Edited by Mike Buckley,
Bill Bordass and
Roderic Bunn

BSRIA BG 9/2010

Research funded by
Technology Strategy Board



Downloadable free from www.usablebuildings.co.uk.

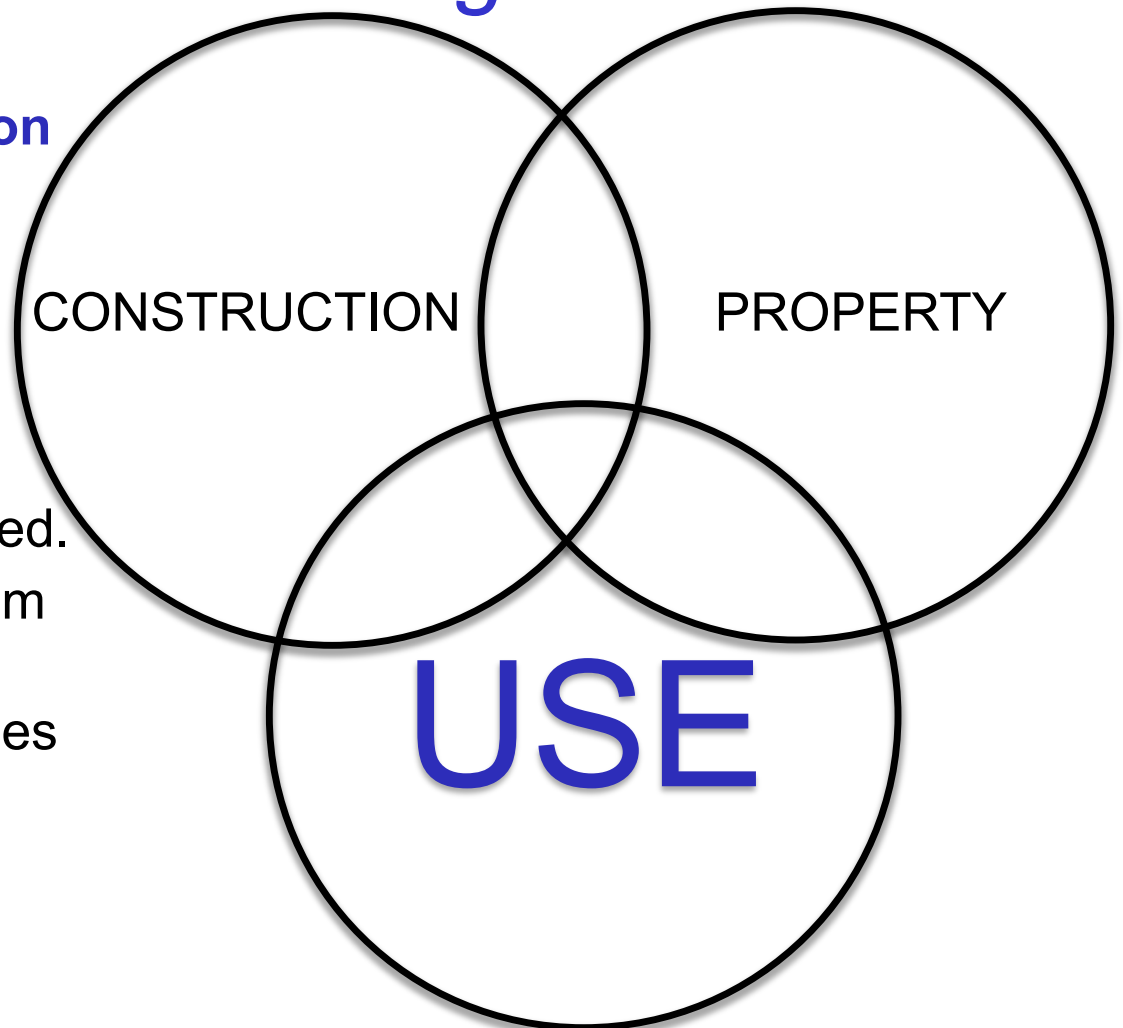
Recap: New Professionals

follow design intent through into reality

- They understand what is needed *strategic briefing*
- Are clear what they want, and communicate it plainly *strategic design*
- Are ambitious, but realistic *question all assumptions, understand users*
- Follow things right through *e.g. using **Soft Landings** procedures*
- Review what they do *manage expectations, undertake reality checks*
- Make others aware of what they are after *specify: what, why and how*
- Check that things will work *technical feasibility, usability and manageability*
- Get things done well, with attention to detail *communicate, train, inspect*
- Finish them off *commission, operational readiness, handover, dialogue*
- Help the users to understand and take ownership *provide aftercare support*
- Review performance in use *including **post-occupancy evaluation***
- Work with occupiers to make things better *monitoring, review and fine tuning*
- Anticipate and spot unintended consequences *revenge effects*
- Learn from it all *and share their experiences*

THEY KEEP THINGS AS SIMPLE AS PRACTICABLE AND DO THEM BETTER

And how about an independent *Institute for Building Use?*



- **Strengthens representation of BUILDING USE**
 - Public interest.
 - Independent.
 - Interdisciplinary from the start. No historic silos.
 - Authoritative, evidence based.
 - Can bring together work from many different sources.
 - Both supports and challenges the construction and property industries.
 - Connects research, practice and policymaking.
 - Institute for Fiscal Studies is a possible analogue.
-

www.usablebuildings.co.uk
