

UCL Masterclass
12 June 2013 #UCLBigPic

BUILDING PERFORMANCE: THE BIGGER PICTURE

PART 1

***Building professionals and the
challenge of sustainability***

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

What is unusual about buildings?

- They are very slow-rotation products, lasting for decades or centuries. *Faster change creates economic activity, but will it be sustainable?*
 - They are multi-purpose and systemic, and serve many and changing purposes over the years. *It's the capabilities that are important.*
 - There is very little feedback of performance to their creators, *who tend to disappear as soon as a project is completed.*
 - Good performance is in the national interest ... *while industry is more interested in doing projects and capturing customers.*
 - Government used to close the feedback loop, e.g. with maintenance, technical services and research departments and the BRE... *nearly all have now been privatized and outsourced.*
 - The role of innovation is widely misunderstood – *not so much about whizzy new technologies, as bringing people, processes and things together in slightly different ways to give markedly better outcomes.*
-

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.
 - Our 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!*
-

Changing the way designers and builders do things

- 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.*

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.
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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

Only get complicated where you really need to.

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

Putting things together: *Productivity and control*

Figure 4: Relationships between control and perceived productivity for office workers in 11 UK buildings surveyed in 1996-97

Building	Type	Average overall percentile	Spearman's Rho (corrected for ties) between mean control and productivity	P value	Significant association between perceived productivity and mean control?
A	AC	52	0.12	0.4133	
B	AC	43	0.17	0.0043	Yes
C	NV	81	0.08	0.4469	
D	NV	12	0.34	0.0348	Yes
E	NV	66	0.30	0.1546	
F	AC	67	0.31	0.0053	Yes
G	MM	91	0.24	0.0425	Yes
H	ANV	43	0.49	0.0002	Yes
I	ANV	22	0.35	0.0033	Yes
J	NV	54	0.16	0.0031	Yes
K	NV	74	0.07	0.6356	

Putting things together:

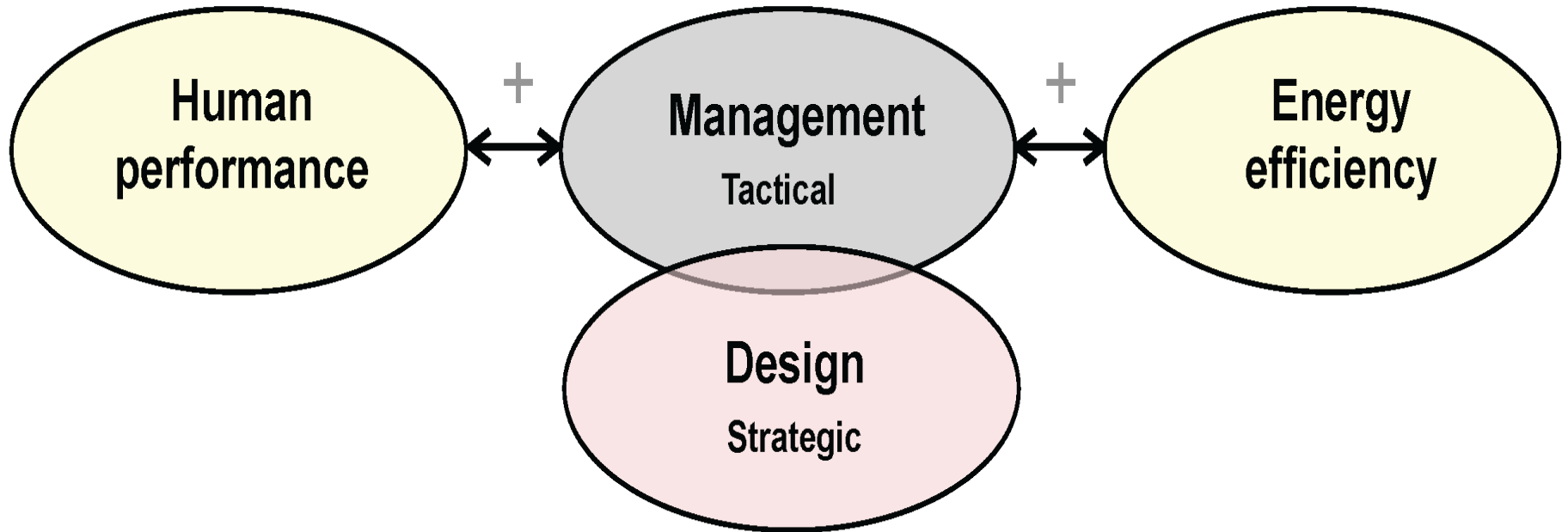
Productivity and speed of response

Figure 9: Relationships between quickness and perceived productivity for office workers in 11 UK buildings surveyed in 1996-97

Building	Type	Average overall percentile	Spearman's Rho (corrected for ties) between mean quickness and productivity	P value	Significant association between perceived productivity and mean quickness?
A	AC	52	0.25	0.0433	Yes
B	AC	43	0.32	0.0001	Yes
C	NV	81	0.01	0.9084	
D	NV	12	0.27	0.0961	
E	NV	66	0.4	0.0805	
F	AC	67	0.35	0.0025	Yes
G	MM	91	0.23	0.0274	Yes
H	ANV	43	0.56	0.0001	Yes
I	ANV	22	0.44	0.0004	Yes
J	NV	54	0.19	0.0005	Yes
K	NV	74	0.35	0.0176	Yes

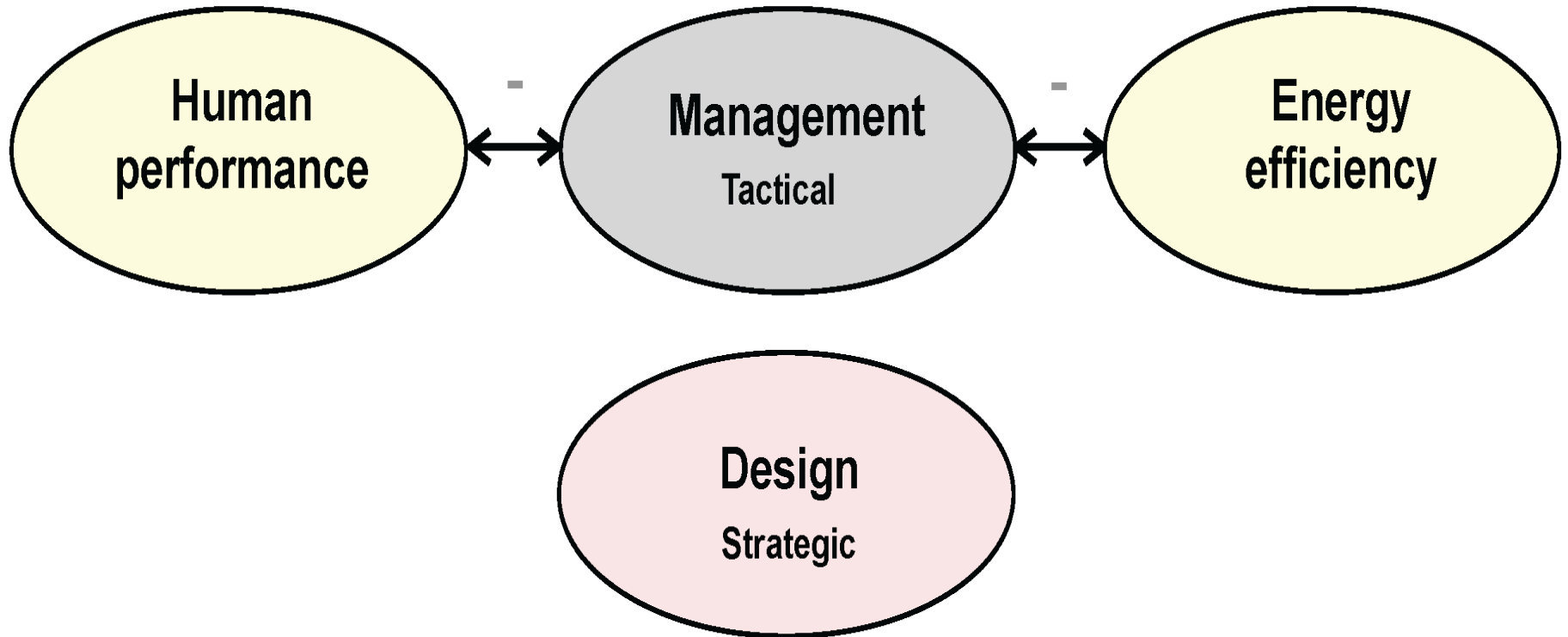
Putting things together: manageability

... where good things happened

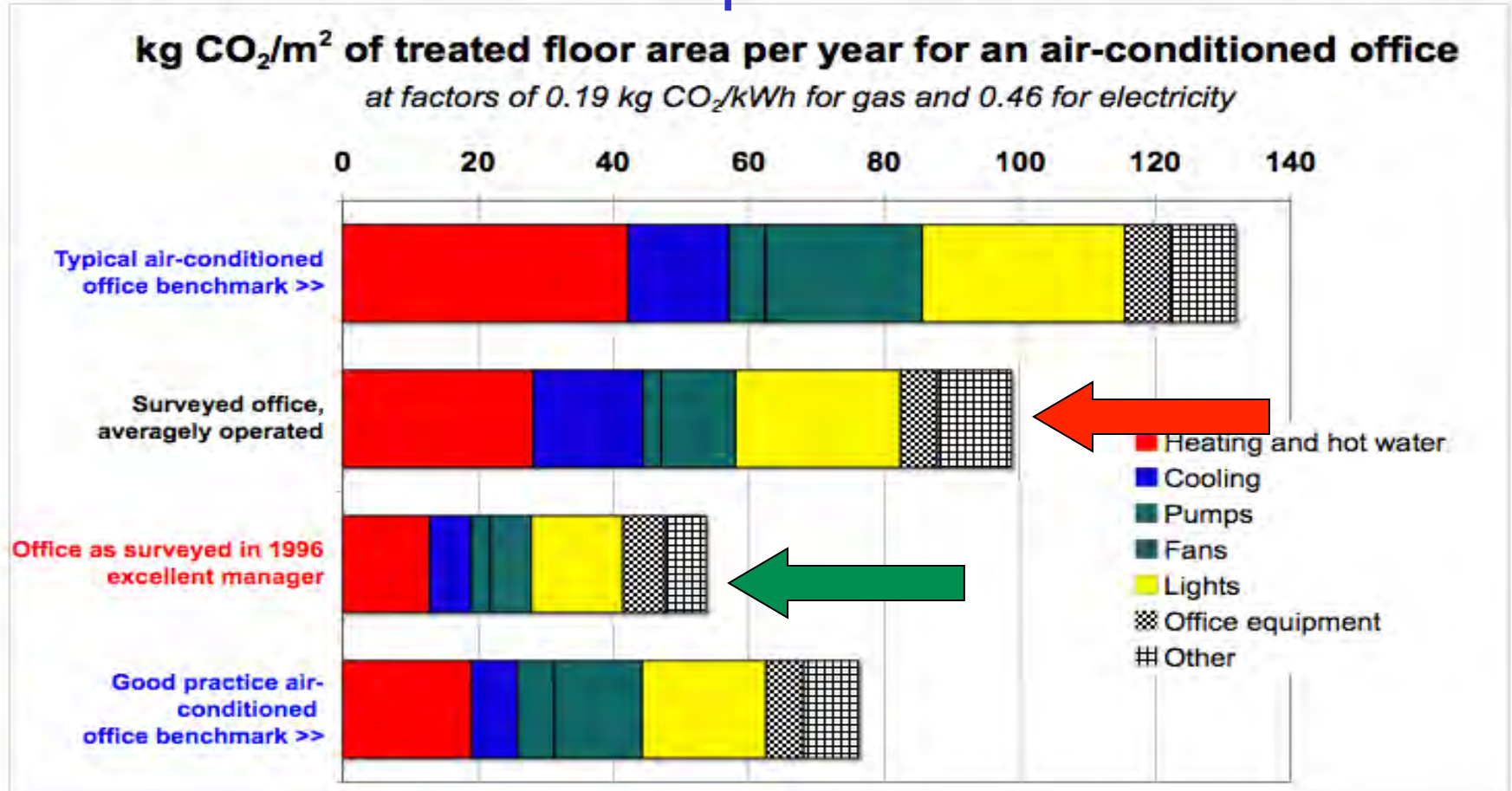


Putting things together: manageability

... and where they didn't



Control and management can have an enormous effect on performance in use ...



In 2000, the excellent office and energy manager was replaced by an outsourced FM company, and the annual energy use nearly doubled.

Another manageability example (1995) *Standard Life, Tanfield House, Edinburgh*



Another manageability example (1995) *Standard Life, Tanfield House, Edinburgh*



Managing for occupant satisfaction

Standard Life, Tanfield House, Edinburgh

Probe I: Occupant survey results	Productivity %	Percentile	Forgiveness	Percentile
Tanfield House, Edinburgh	8.00	96	1.15	88
I Aldermanbury Square, London	-4.20	36	0.99	14
Cable and Wireless College, Coventry	-8.01	14	1.13	81
C&G Chief Office, Gloucester	•	•	1.14	86
De Montfort Queen's Building, Leicester	-10.00	8	1.09	63
Woodhouse Medical Centre, Sheffield	10.90	99	1.25	99
Homeowners Friendly Society, Harrogate	2.10	84	0.99	17
APU Queen's Building, Chelmsford	-5.60	26	1.02	27
	95% upper	-4.22	1.09	
Benchmark mean n=49	-2.62		1.07	
	95% lower	-1.01	1.04	

You can't tell if you have a good building
... unless you find out how it is working

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

When natural ventilation was all the rage, a novel form of mechanical ventilation was quietly slipping into Britain: the Swedish Termodeck system. One of the first buildings to use Termodeck and other Swedish detailing was an academic facility at the University of East Anglia. How has it fared?

BY THE PROBE TEAM

PROBE

14: Elizabeth Fry Building



14 ELIZABETH FRY BUILDING

LETTER TO ARCHITECTS' JOURNAL

The good performers don't necessarily impress the judges

It's the process, 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 *(easier now, but needs to be sustained).*

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

And where are those buildings today?

PSI demolished and replaced by a block of flats.

***WHY?** Occupant moved into a university, land value.*

1 Bridewell St. no longer has its good manager.

***WHY?** Outsourced FM across occupier's portfolio.*

Tanfield nearly demolished, then broken into units.

***WHY?** Economic changes, market exit strategy.*

Elizabeth Fry altered, not performing quite as well.

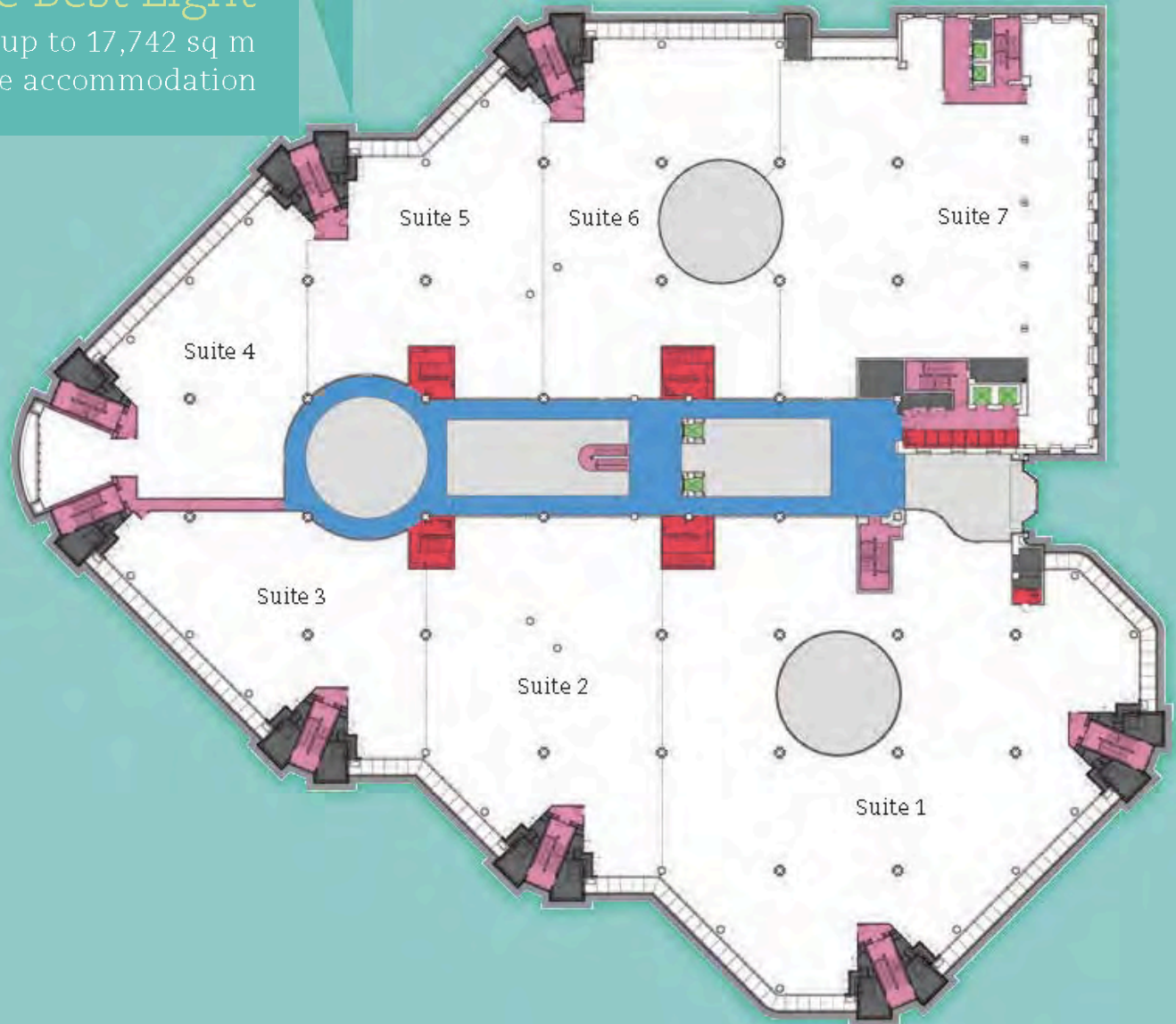
***WHY?** Changing organisational priorities ... but why?*

Tanfield

Your Business In The Best Light

Tanfield, Edinburgh, offering up to 17,742 sq m (190,972 sq ft) of flexible office accommodation

... divided up for letting

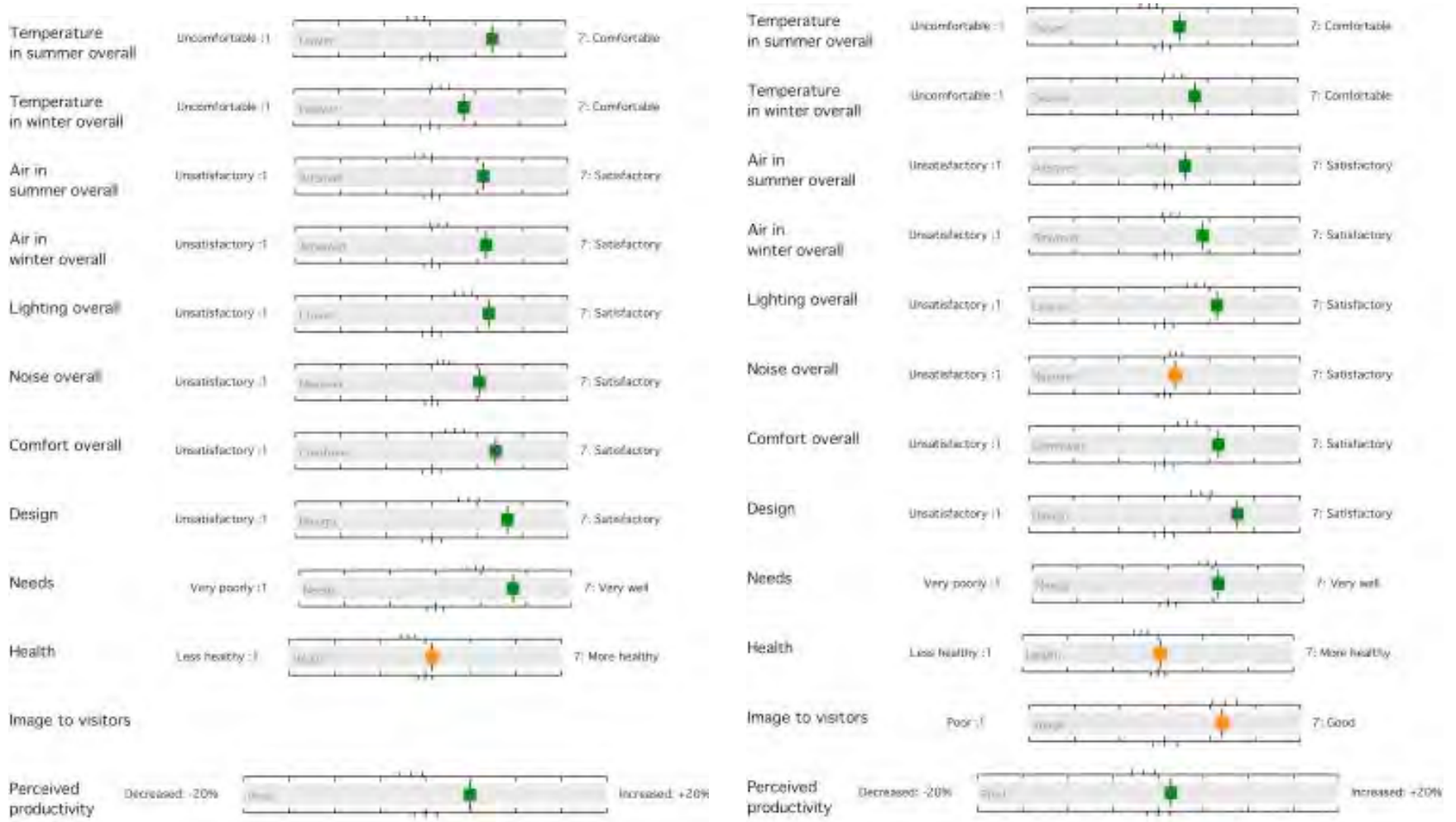


Elizabeth Fry 2011: airtightness retained



Elizabeth Fry Revisit - Occupant Survey

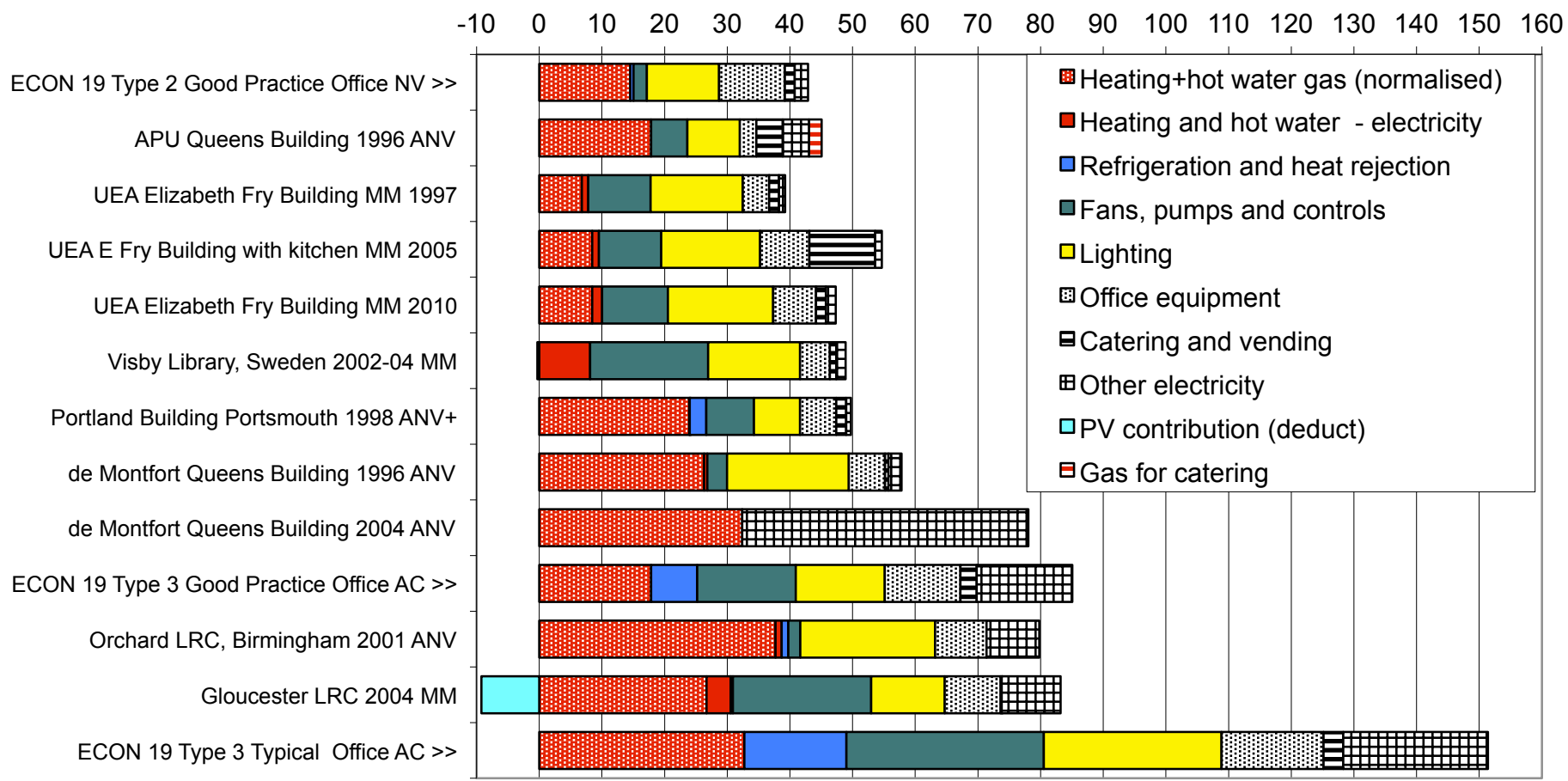
1996 2011



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



Elizabeth Fry 2011: *the best-liked seminar rooms in the university replaced by offices: Why?*



Innovation not as novelty ... *but as purposeful improvement*

- Know what you need to improve *by understanding how buildings actually work in the hands of their occupiers.*
 - Understand the context and the constraints, and try not to impose additional constraints. *However, there is a fine line between a constraint and a helpful discipline.*
 - Beware the false promises of technologies:
How much support do they need?
Is this affordable in relation to the benefits?
 - Is the solution likely to be robust?
Might there be unintended consequences?
-

Fit and forget? *Or not?*

Design for usability and manageability

Physical variables

Context-free	A Fit and forget <i>Make invisible</i>	B Implement and manage <i>Make usable</i>
	<i>Make habitual</i> Implement and internalise C	<i>Make acceptable</i> Risk and robustness D

Context-dependent

Behavioural variables

Technology - management interactions: *Strategic conclusions from the Probe studies of public and commercial buildings in use*

		Technological complexity	
		More	Less
Building management input	More	<i>Type A</i> Effective, but often costly	<i>Type D</i> Rare, not replicable?
	Less	Risky with performance penalties <i>Type C</i>	Effective, but often small-scale <i>Type B</i>

Diagram first appeared in: *Probe 19: Designer Feedback*, Building Services, the CIBSE Journal, page E21 (March 1999).

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 style="border: 1px solid red; padding: 5px; text-align: center;">High Performance</div>	<div style="border: 1px solid red; padding: 5px; text-align: center;">Will ordinary people be able to look after them?</div>
		<div style="border: 1px solid red; padding: 5px; text-align: center;">Big danger, especially for public buildings</div>	<div style="border: 1px solid red; padding: 5px; text-align: center;">Simple Smart</div> <div style="border: 1px solid red; padding: 5px; text-align: center;">Sense and Science</div> <div style="text-align: center;">Type B</div>

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

Why do we need a new professionalism?

What has changed over the decades?

- The urgent need to reduce the environmental impact of existing and new buildings: *we must now find ways to do this quickly and reliably.*
 - Shortages of financial and material resources: *we can no longer afford to “invest” in the wrong things, but we can do things more carefully.*
 - Rapid technological, social and economic change: *we need to keep ahead of the game.*
 - **Increasing (often unnecessary) complication** of requirements, process and product: *we need to find what works well and do it better.*
 - **Outsourcing of technical and operational skills**, research and feedback by government: *we need to replace this lost practical expertise.*
 - **Excessive reliance on economics**, contracts and markets: *we need to go beyond the specification and the profit motive.*
 - **Virtualisation of education and practice**: *professionals need to confront the consequences of their actions, learn from them and share results.*
 - **30 years of professionalism being regarded as anti-competitive or elitist**: *but how else can those we trust also have the wider interests at heart?*
 - **Destruction of professional judgment by PR**, *reinforcing received wisdom.*
-

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