User Needs and Expectations

Chapter for Cole R. and Lorch R. (eds), Buildings, Culture and the Environment, Blackwell Publishing, 2002

Adrian Leaman
Building Use Studies

Keywords: Buildings, Users, Needs, Perceptions, Habits, Productivity, Performance, Probe, Workplace, Strategy

Introduction

Over the past ten years or so, Building Use Studies has carried out 150 studies of buildings, mainly from the point of view of their occupants, but also often including their environmental and technical performance. Some of these, the Probe studies, are in the public domain, so it is possible to read about them (Reference 1). Although most of the buildings are in the UK, the basic methods have been applied to others in Australia, New Zealand, Malaysia, Singapore, Hong Kong, the Netherlands, the USA, and there are more countries in the pipeline.

Inevitably, the question arises about global similarities and differences, especially in building users' attitudes and preferences, but also in comparisons between buildings themselves. For example, British buildings seem to be more "stressed" with higher occupation densities, more likelihood of open plan layouts and an increasing tendency for 24-hour / 7-day operation. Features in offices which occupants like (such as lower densities, cellularisation, natural light and controllability) seem to be less common than they are in mainland Europe. This might mean that British buildings overall compare unfavourably, for instance, with European counterparts. However, British buildings, at least from their occupants' perspective, seem to be improving, albeit slowly.

Sadly, many of the answers are unknown, partly because our samples outside the UK are, as yet, too small. There is also the thorny problem of "controlling for context". Operating circumstances are so different from one case to the next that it is often impossible to be sure that like is being compared with like. The dilemma to avoid when comparing buildings is to compare unlike with unlike! There is too much "uncontrollable" (in the statistical sense) variation, and the data are thus too "noisy" to be able to draw firm conclusions. For example, our building samples from Australia and New Zealand tend to show that Australasian buildings are healthier, but this may be the result of a healthier lifestyle along with more opportunities for occupants to get away from their desks and go outside during the day rather than intrinsic physical differences in the buildings themselves.

User needs: the wider picture

As well as methodological considerations, there is also the inherent complexity of buildings as total systems. Figure 1 gives an idea of the kind of complexity involved. The parts that are most relevant to our subject matter here are:

1: Habits, Needs, Preferences, and

2: User Strategies.

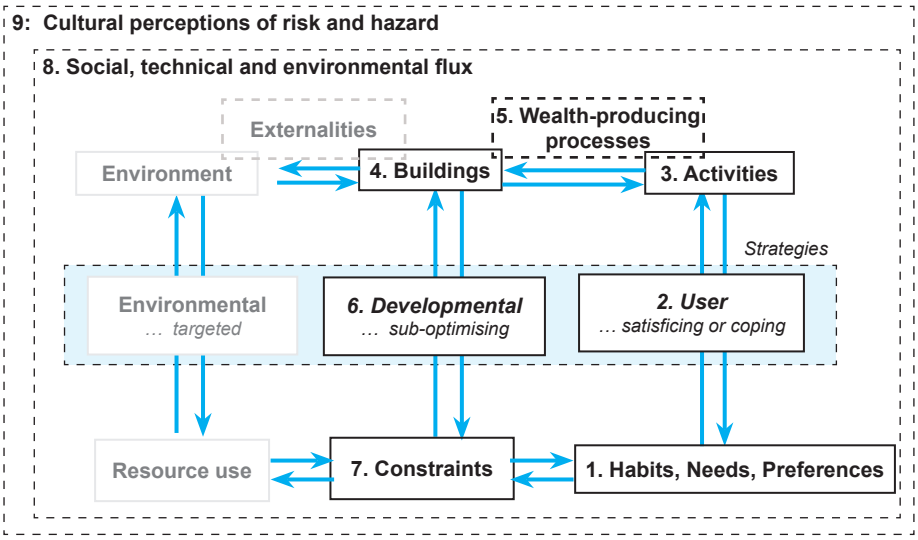
These refer to the likes and behaviours of "ordinary" building occupants - the people who use and work in buildings every day, but usually have no active part in designing or managing them. There are also other classes of user, like facilities managers and designers, who have different perceptions of need and different ideas of how to service them. Facilities managers tend to provide services on a "good enough" basis, designers tend to oversimplify or parody user needs (Reference 2).

Almost all occupants treat buildings as a means to an end. Most are not really interested in design or management matters. They want to carry out their tasks and activities as easily and effectively as possible. They just want to get on with what they do with the least inconvenience, usually to themselves.

This is the main reason why we repeatedly find that building occupants say they are most satisfied and productive when:

thermal conditions are perceived as comfortable and relatively stable, and

Figure 1: Context "map"



The parts of this diagram specifically covered here in the text are numbered and shown in bold type.

there is rapid response when things go wrong, not just in the thermal conditions, but in all kinds of ways, such as the speed and effectiveness of the help desk (if there is one) or the usability and effectiveness of controls for e.g. lights and windows.

Buildings which are both thermally comfortable and have "rapid response systems" are almost invariably well-liked by occupants, even if the buildings themselves are scruffy or architecturally undistinguished.

Habits, needs and preferences are to some extent culturally dependent. They are affected by attitudes to health, safety, risk, and fashion as well as regulations, and organisational and social norms. In recent years, expectations about, for example, building-related health have been rising rapidly, so conditions which were tolerated a decade ago are now unacceptable.

Whatever the prevailing norms, most building users have to accept what they find as "givens". This is why their behaviour, with the occasional exception, is "coping" or "satisficing". They make the best they can of things because they are rarely able to create conditions which optimally suit them. This applies even to those with seemingly the most power - senior managers, for instance. Although they may be able to commandeer the best locations for themselves (e.g. offices with the best window views at the top of the building), they still rarely go as far as changing things radically for the better.

As building performance studies have found, most buildings (approximately 90% in the UK) suffer from chronic performance problems (e.g. overheating or poor air quality) which ultimately affect users' health and productivity.

As Figure 1 shows, users' needs and preferences are (obviously) linked to user strategies which in turn are connected to
3: Activities.
'Activities' in this case simply means the collective tasks that are being carried out in buildings - office, health, educational or whatever. Users will be almost completely pre-occupied with carrying out tasks and activities to the best of their ability. They will often see the building as a hindrance to this, and tend to take a negative view of it. Most of the time they will not know or care about the architecture, services or facilities management. They take it as a "given" that the environment should support what they have been tasked to do. Similarly, clients also tend to assume that designers will automatically provide them with a healthy, safe, comfortable, flexible, energy efficient and spacious environment.

Referring again to Figure 1, activities are carried out within

4: Buildings

(meaning the enclosing physical fabric and spaces) which themselves contribute to

5: Wealth-producing processes.

This is what buildings are for!

Surprisingly, this is often overlooked. Buildings are also wealth-producing in terms of their role in property and property-related investments. In Britain, for example, their value as property usually exceeds their "activity" value.

As well as their value in use and exchange, the power of imagery must not be forgotten. Again, image often trumps use value. Despite what many designers think, image is usually low on users' priorities. Our research has found that users are especially suspicious of famous designers. Users tend not to give famous designers the benefit of any doubt that there might be about the building's image and the way it works in practice. Users often think that too much emphasis is given to how a building looks and not enough to the way it functions and supports users' activities. They are usually right!

Buildings themselves are created by a completely different set of decision-making processes to those used by normal occupants, represented in Figure 1 as

6: Development strategies.

These. of course, have to operate within

7: Constraints

(e.g. the existing physical infrastructure, planning law and investment market, as well as time, cost and quality criteria).

Development strategies gain utility by seeking out perceived benefits (usually profit) within the boundaries of the perceived constraints. This is summarised in Figure 1 as "sub-optimising", for want of a better term.

To complete the picture in Figure 1, everything connected in boxes 1-7 operates within a background of :

8: Social, technical and environmental flux (the volatility of underlying change) and

9: Cultural perceptions of risk and hazard (how local cultures affect perceptions and behaviours).

The terminology of hazard perception comes from cultural geography based on life-and-death fundamentals. For example, risks of inundation by flood help to explain why the modern integrated urban planning and transport systems in the Netherlands are second to none in the world. Overcoming the threat of winter cold is vital to survival in Scandinavia, so more attention is devoted in Scandinavia to ventilation, comfort and the indoor environment and, perhaps, commensurately less elsewhere. In our (limited) experience with buildings outside Britain, the Dutch seem both to get the basics right and integrate well across disciplines Ventilation strategies are obviously important in cold-climate countries, which may help to explain why Scandinavian understanding of ventilation seems to be so well developed.

Cultural imperatives like these help set objectives, often non-negotiable, because they are "embedded". No doubt readers will be able to think of examples from their own cultures. The British, for instance, seem to be historically fixated with their own political and cultural independence, and threats to it, real or imagined, Such traits are not causes as such, but form a backcloth to decision-making and behaviour. This is often "invisible" from within the culture but more obvious to outsiders; even so, it is still hard to pin down. It is often difficult to escape from cries of "determinism" when discussing cultures and the environment. Any doubters should revisit Rapoport's classic anthropological study "House Form and Culture" (Reference 3), one of the few successful attempts to understand comparative cultures and buildings.

Social, technical and environmental flux on Figure 1 represents the volatility of change, including innovation, government regulation, physical change, social mores and political systems, all of which can affect buildings and their use, but often unpredictably. Particular things assume global importance: viz climate change and energy efficiency, but others, especially national regulations, may be just as significant in their own way. For example, the human and environmental performance of German office buildings may have been considerably improved by building regulation restrictions on depth of space.

Buildings are susceptible to unpredictable events which have have unseen effects. For instance: the sudden obsolescence of London 1980s office buildings that were unable to incorporate raised floors for cabling because floor-to-ceiling heights were too shallow. However, other fashion and cultural perceptions were also at work which included:

letting agents' preferences, which at that time were variable air volume (VAV) air conditioning. This needed more headroom despite the availability of fan coils which did not
developers, who sometimes liked to declare buildings obsolete because redevelopment allowed them to increase plot ratios

There are many more examples where real outcomes are not just a result of design intent or rational user requirements, but a much more profound mixture of culture, social change and background constraints operating together in a unique brew with liberal dashes of chance added.

What does Figure 1 say about user needs and expectations? The main point is that the context for users is not really linked to the physical "building" variables at all; it is dominated by what might be called the "behavioural" variables on the right-hand side of the diagram. Users give highest importance to:

- the activities or tasks in which they are primarily engaged
- their preferences, which have a firm cultural basis (but there are also other factors like physiology which can be predicted independently of culture).

This is a polite way of saying that most users don't really care very much about buildings and their architecture!

Four strategies

Figure 2 considers context from a designer's perspective. "Physical" and "behavioural" are used in the same sense as just described for Figure 1. "Context free" refers to principles, rules and processes that may be applied anywhere irrespective of context. "Context dependent" are factors locally determined.

The two-by-two matrix of Figure 2 gives four quadrants, implying four design strategies:

- Make invisible - those things which are supposed to work only in the background with little or no human intervention
- Make usable - things needing regular attention and/or interaction. Importantly, this is linked in to management culture and occupier convenience
- Make habitual - formal and informal rules which help with safe comfortable and smooth running. This is more a matter for individuals
- Make acceptable - things which are not prescribed and covered by the rules but allow scope for individuality, innovation and change

Our evidence shows that the best buildings tend to perform well in all four quadrants. For example, buildings which can properly be said to be flexible and adaptable will have included consideration of all four strategies somewhere in the briefing, design and operations thinking. This includes issues such as usability, innovation, habit (i.e. cultural norms in the organisation and user etiquette), safety, security, risk, value and uncertainty.

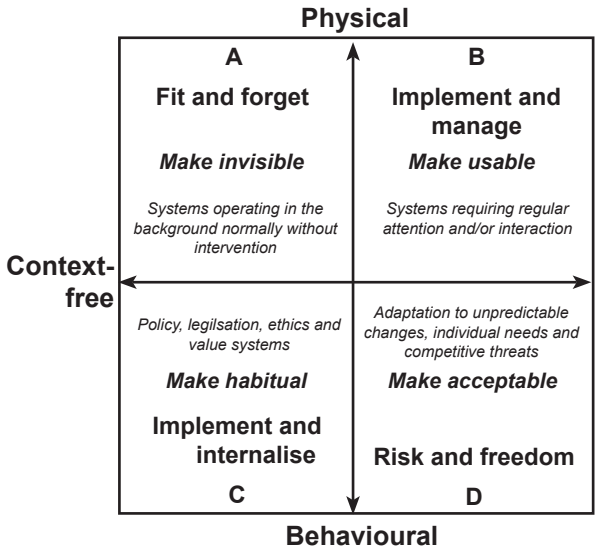
More generally:

- technology which is intended to work "in the background" really does, so there is no need for constant management vigilence
- where there is need for intervention, interfaces are easy for users to understand, and give clear feedback about their operating status (i.e. whether or not they are working) and their effects (i.e. what change has been induced)
- users may over-ride systems, so they always have other options, especially in emergencies
- the system has enough "degrees of freedom", "carrying capacity" or "redundancy" to cope with unpredictable change (e.g. unexpected increase in occupant densities)
- as a result, the building is perceived as flexible and/or adaptable
- because of the intrinsic adaptiveness of the system users are more likely to tolerate the flaws that will inevitably exist - they do not feel that the building is forcing them to do things against their will or best interests.

However, the modern tendency is to push as many things as possible into Quadrant A - "fit and forget" and leave the consequences of leakage back into the other three for someone else to worry about. Unfortunately for us all, side effects cannot be forgotten, even if they are not immediately foreseeable or included in cost-benefit equations or risk-value payoff calculations.

Globalisation (the context-free, left-hand part of the diagram) occupies quadrants A and C: a combination of "fit and forget" and "implement

Figure 2: Four design strategies



and internalise" - a one-size-fits-all, minimum redundancy approach. This suits a market and supply-chain-led vision of building provision, but is inappropriate on the demand side, especially in dealing with rapid change, local differences, capacity shifts and locational preference changes. The exceptions are those relatively rare circumstances where user requirements are predictable or relatively simple (as in hotel guest rooms, for example).

From the user needs perspective (see Figure 2):

1. Quadrant A (fit and forget) implies that many building functions should properly operate in the background so that the normal user is never aware of them (e.g. structural integrity, fire protection, comfort provision, health and safety provision, ergonomics). However, it is not appropriate to try to place all functions here by, for example, automation or excessive provision of computer-assisted "intelligence" or standardisation.

2 B (implement and manage) covers those aspects of buildings where user or management intervention is required and necessary, as with, for example, adaptive comfort control through usable controls, or understandable building management system (BMS) computer interfaces.

3. C (implement and internalise) includes aspects of user behaviour which ideally need to be habitual (that is, carried out without undue thought), including, for example, response to fire alarms, etiquette in the use of space and respect for colleagues' preferences.

4. D (risk and freedom) - so named after John Adams' book [Reference 4] - covers all those aspects of buildings that cannot be legislated for or easily anticipated in the design. This includes unexpected innovations, unusual behaviours, emerging uses, unusual or bizarre circumstances and improbable coincidences. Situations may or may not be risky and/or dangerous. People adjust their reactions and behaviour to cope with the circumstances. "Common sense" is the byword here.

Emergence

A further aspect within Figure 1 and Figure 2 is "emergence". Buildings are usually more or less the sum of their parts. When the parts complement each other properly, the interacting system creates virtuous outcomes which are often delightful to experience and use. Outcomes depend on whether designers understand and utilise the governing constraints to best effect and, subsequently, whether the occupants can manage the building effectively and adapt requirements to it without being unduly hobbled by unnecessary costs or inefficiencies. Excellence in design conjures away onerous constraints (like an inhospitable site or inclement local climate) and makes them seemingly irrelevant to the user. They are still there, of course!

In reality, constraints tend to be both more mundane and less easy to perceive - cost and time are the main ones, vanity and corporate egos are amongst the others. The best buildings from the users' perspective are not necessarily the most architecturally appealing, but comfortable, convenient and capable of rapid response when things go wrong. Astute building management can turn otherwise unprepossessing buildings into a pleasure to use by exercising simple strategies which are understood by all and easy to implement, like "keep as new". People like buildings that can support the activities that they carry out with minimal fuss and without getting in the way too much.

Figure 3: Some factors for success at the Elizabeth Fry Building

- **A committed client**
- **A brief with clear targets**
- **A team which has worked together on the site**
- **Specialist support (e.g. on fabric insulation and air-tightness)**
- **A robust design, efficiently serviced**
- **Enough time and money**
- **An appropriate specification (and not too clever)**
- **An interested contractor (and a traditional contract)**
- **Well-built with attention to detail**
- **Well controlled (but only eventually after monitoring)**
- **Post-handover support (triggered by independent monitoring)**
- **Management vigilance**

Source Reference 5

Figure 4: Simple guidelines

- **Process** before **Product**
- **Product** and back to **Process**
- **Passive** before **Active**
- **Simple** before **Complicated**
- **Better** before **More**
- **Prevention** before **Cure**
- **80** before **20**
- **Robust** before **Fragile**
- **Self-managing** before **Managed**
- **Efficient** before **Elaborate**
- **Intelligible** before **Intelligent**
- **Usable** before **Alienating**
- **Forgiving** before **Demanding**
- **Assets** before **Nuisances**
- **Off** before **On**
- **Experience** before **Hope**
- **Thought** before **Action**
- **Horses** before **Carts**

Source: Reference 6

Such buildings do not have to be aesthetically outstanding, although this can help to make them more forgiving of shortcomings though, in our experience, not much. Indeed, these very attributes can become a source of irritation.

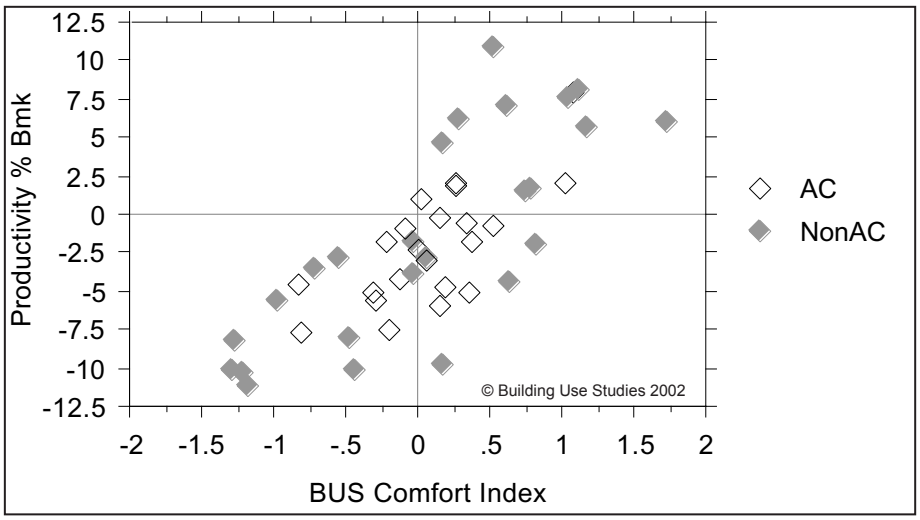
Depressingly, it is more common with modern buildings (at least in our experience in the UK) to experience emergence of the unwanted kind: chronic performance failures e.g. overheating and noise, and waste like poor energy efficiency; and worse - sick buildings, or unredeemable vandalism, for example. Trying not to sound too pessimistic, it is much more common to find occupiers who are struggling to overcome the user and management problems caused by chronic faults. In the extreme cases, like St John's House, an office building in Bootle, UK the end result was demolition (in late 2001). Although this was widely attributed to "sick building syndrome" the strategic cause was most probably the mismatch between what the building demanded to keep it healthy and what its management was prepared to provide.

Although designers might think they are able to predict and control emergent properties, in reality it is much more hit-and-miss. Even when an excellent building has been achieved it is hard to repeat the success. The mix of variables - physical and process - will never be copied twice over so it almost pointless to try and duplicate the exercise with exactly the same formula. Even so, people want to know what the formula is. Figure 3 lists some of the factors for success at the Elizabeth Fry Building, University of East Anglia, UK. Figure 4 is a summary of guidelines which help set pre-conditions for encouraging good emergent qualities. The special emphasis that needs to be given to specific aspects will vary with culture. For example, we have examined low-energy buildings in the UK and Sweden. While there are many quantitative similarities, it seems that higher levels of robustness, efficiency and build quality are more routinely delivered in Sweden, with less effort from clients and designers. The reason may be connected with requirements for better air tightness, given the winter conditions, plus better attention to design detail and lower occupant densities.

Findings from user studies

At a more practical level, our research has revealed a consistency in user needs. Building Use Studies' current dataset has 124 buildings, of which 18 are from outside the UK (Reference 9). The last 50 surveyed in the UK/Ireland are used for benchmarking.

Figure 5: Comfort and productivity associations (UK and Ireland)



Each data point represents a building in the current (2002) UK dataset. The BUS Comfort Index covers heating, cooling, ventilation, lighting and noise. Productivities are self-assessed.

For air-condtioned buildings, r=0.73; for non-AC (i.e. natural ventilation and mixed-mode) r=0.79 (both are significant associations).

Further details may be found on **www.usablebuildings.co.uk**

For the UK/Ireland dataset, the general findings are:

Productivity, health and satisfaction variables are almost always linked to comfort - the better occupants think the indoor environment is, the more likely people will say that they are productive, healthy and happy, see Figure 5 (similar graphs can be shown for e.g. comfort and perceived health).

People usually say they perform better when they have relatively more control over the heating, cooling, ventilation, noise and lighting in their immediate vicinity (often in that order of importance).

If control is not available to occupants through physical means (e.g. window blinds and radiator controls), then it usually can be made up for by pro-active, rapid, or, (in the absence of anything else) honest responses from friendly, diligent facility management staff, and by excellent design and technical performance. This will provide a substitute, so control will seldom need to be exercised. However, at least in the UK, this level of excellence is seldom achieved owing to various cultural and market factors

People want things that are usable, manageable and work well for them on demand or without holding them up too much or getting in the way of their task in hand. Despite what designers think, nice-looking working environments tend to be lower down occupants' priority lists

Naturally-ventilated buildings can give surprisingly good results mainly where there is simple, good and effective user control, even where the conditions are objectively less good than in many air-conditioned environments. The downside is that "over-stressed" naturally-ventilated buildings (such as those that are too deep in plan form, too densely occupied, or with limited or idiosyncratic user control) can produce dreadful conditions, especially in the height of summer. In Figure 5, the most comfortable and productive buildings (top right) are naturally ventilated, but so too are the worst

The more functions and activities people have to cope with, the less likely they are to say they are productive as well. So open plan often scores worse simply because the number of activities is greater. The potential for unmanageable conflicts is also higher (there are always exceptions, though)

Noise is a bugbear, especially with random distractions created by activities which are perceived as irrelevant to a particular individuals' requirements. This, obviously, is worse in open plan

These generalisations can also be presented as the aspects of buildings which people prefer. Readers will know most of the answers from their own experiences of buildings. The following list is adapted from the Probe studies [Reference 7].

High occupant satisfaction is easier to achieve when all or most of the following features are present in the total system (because they help virtuous processes develop and/or give occupants better control, which ultimately improves their tolerance).

These include:

- Shallower plan forms and depths of space (usually less than 15m across the building)
- Degrees of cellularisation (not necessarily in single-person spaces, but at least laid out so that workgroup integrity is preserved)
- Thermal mass
- Absence of gratuitous glazing
- Stable and comfortable thermal conditions
- Absence of distracting noise (what this constitutes varies greatly with context)
- Controlled background ventilation without unwanted air infiltration
- Openable windows
- Views out
- Usable controls and interfaces
- A non-sedentary workforce (people are sitting at e.g. VDUs all day long)
- Predictable occupancy patterns
- Well-informed, responsive and diligent management
- Places to go at break times inside or away from the building

Published examples of buildings which meet most of these criteria with high levels of excellence are the Elizabeth Fry Building, Norwich UK [Reference 1] and the Tax Office, Enschede, Netherlands [Reference 1], both in the Probe series.

The tendency for things to become unmanageable, and thus for occupants' tolerance to decline, can be made worse by some or all of these:

- Deeper plan forms with variable qualities of indoor conditions (e.g. worse towards the middle, better towards the windows).
- Senior staff monopolising the best places, often also leaving them unoccupied when others have to suffer.
- Areas in use for staff workstations which were not originally intended to be so (e.g. converted storage areas, basements and meeting rooms).
- Large open work areas with little variety in them.
- Larger workgroups (above about six people).
- Workgroups where people are not sitting within line of sight and earshot of each other, perhaps with people split between different locations.
- People sitting too close to sources of noise and random distraction like entrance/exit doors, kitchens, photocopiers and touchdown areas.
- People sitting with their backs to colleagues or circulation areas.
- Too many conflicting activities in one area (especially where people needing to concentrate are mixed in with people needing to communicate frequently).
- Higher densities (tolerance thresholds differ in various parts of the world so there is no rule of thumb).
- Longer working hours.
- Presence of complex technology.
- Ineffective, absent or bossy facilities management.

The best results are usually obtained where:

- the indoor environmental conditions are perceived as comfortable, stable and predictable; but …
- when things go wrong (not just with the ambient conditions but with other things as well like office equipment or furniture failures) there is a rapid and effective response system in place. This can be empowered individuals using their initiative and common sense (e.g. with window and blind controls which they can operate themselves), or a management system which works properly.

Rapid response is the key, it must be present somewhere in the total system, ideally in both the physically designed components and in the management systems. Anything that prevents rapid response happening in practice will reduce perceived performance.

Wider implications

What have we learned that helps improve buildings worldwide and transfer some of these findings between cultures? Figure 6 comes from overview papers on the Probe post-occupancy studies (Reference 8). It has nine sub-headings, three each under the main headings at the top: “Ends”, “Linking Tools (feedback)” and “Means”. This is intended to help organise briefing, feedback and design responses, so that emphasis is put in the right places.

The current emphasis on means (on the right-hand side) almost always swamps ends and feedback. This is not necessarily a problem in a stable situation where the buildings routinely being delivered suit the occupiers’ requirements - as seems to occur quite routinely in Scandinavia, for instance - but causes major difficulties in the UK where we have found quite large mismatches.

Ends: Strategy First

As building procurement, design and delivery is a complex and time-consuming process, people often forget what buildings are for. They then find it difficult to evaluate what they end up with because they are uncertain about the evaluation criteria. The best buildings (for occupants, investment potential and environmental performance) tend to be those where targets are always made clear in a brief which is understandable by all the players, users and occupants included.

A clear brief also makes it much easier to test the building in use to see if the expectations have been met. When the brief is muddled, we find that needs and expectations become conflated and people develop unrealistic expectations of what the new building will do. When this happens, the client will always be disappointed because expectations have not been managed properly, partly because no-one really knows what problem the building was supposed to be the answer to in the first place. However, one cannot just prepare a brief and go away: indeed, many briefs prepared like this focus on means rather than ends anyway. As a design develops, so does the dialogue between client requirements and the solutions being offered, so the brief has to evolve.

Ends: Establish the Essentials

When thinking about the requirements for new buildings, clients tend to forget about - or (rightly) assume that the professionals will deliver - the obvious, e.g. basic comfort, air-tightness and energy efficiency. In the brief, the essentials need to be clearly established, not just wish lists of desirables. Almost invariably, well-defined baseline requirements will help to produce virtuous outcomes elsewhere in the system. Most vitally, “don’t procure what you can’t manage”: that is, do not create a building which is beyond the occupying organisation’s skills and resources.

Ends: Targets are always moving

Increasingly, targets are not just on the physical side of the building, but on the human. In the UK, there is constant cost pressure to increase densities, reduce “churn” and cut facilities management (FM) budgets. This can be risky because higher densities increase the chances of functional conflicts (in e.g. open-plan offices), lower costs often mean excessive “reverse engineering” like less user controls (important for perceived productivity) and lower (or contracted out) FM inputs can mean lower response times. On the other hand, pressures (e.g. availability of skilled staff) can mean that buildings are used as lures to attract staff. Issues such as density and capacity are especially important where staff numbers are volatile and there are few other options for planners (e.g. alternative locations).

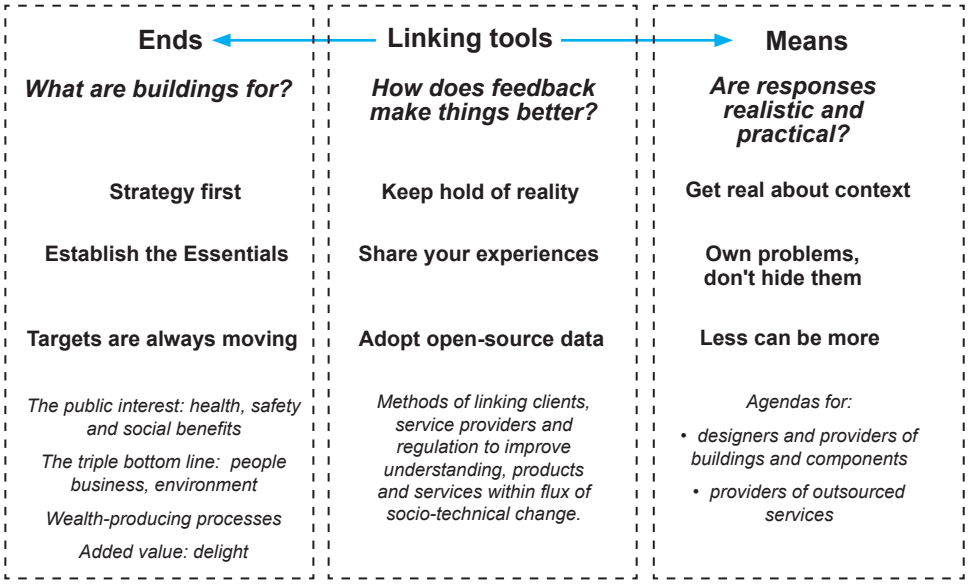
Linking tools: Keep hold of reality

For some years we have advocated design brief management (Reference 9) as a way of keeping a grip on reality in what otherwise can become a myopic process. By giving the client control over brief management, keeping performance under review through regular reality checks and constantly reviewing outcomes against expectations, there is a greater chance of success, especially for the end user. But to date few clients give someone the explicit responsibility of Design Brief Manager. It often gets absorbed within a project management activity which focus on means (particularly resources, cost and time), takes short cuts and ends up losing sight of ends.

Linking tools: Share your experiences

This is one of the weakest areas in the construction industry: the ability to both learn on the job and share experiences, for good or ill. The Probe project [Reference 1] is one of only a handful worldwide that have placed findings from studies of building performance into

Figure 6: Ends, means and feedback



Source: *Reference 8*

the public domain so that clients, managers and designers can learn from the experiences. Probe has not emerged from the professions, government agencies or design practices, but from a group of small consultancies linked with a publisher, part-funded by government. In the UK, there are many more who advocate post-occupancy evaluation than actually carry it out, presumably because they perceive risks to be greater than the benefits.

Linking tools: Adopt open source data

Meaningful feedback is impossible without comparable data. In the UK, professions still have different ways of measuring space in buildings (even though standards are set down by the RICS), which makes it doubly difficult to compare and calibrate. Similarly, there are no de facto methods of consistently measuring, assessing and reporting, for example, energy and water consumption (energy may improve within the next few years following a European Union directive on the energy certification of buildings). It is not just measurement that is the problem, but classification and coding. In the studies described earlier, we are beginning to overcome the open source data problem by licensing arrangements.

Means: Get real about context

With buildings, context is everything. It is vital to understand the influences of the ruling constraints, resources, their relative risks and the opportunities they present. One of the more fruitless activities of building research is to make constraints vanish either by controlling for them in simulations or in the laboratory, or by trying to normalise data to fit assumption sets. A 'real-world' approach [Reference 10] has many virtues, one of which is that the richness of context shines through. Treat context as a feature, not a bug!

Means: Own problems, don't hide them

This is also about realism in problem-solving and decision-taking. What are the tasks for the professionals and the occupiers' management, and what can reasonably be left to individual users? For example, noise in offices falls across all three, and often becomes chronic because no-one has properly "owned" the problem during design, handover and first occupation / snagging. Unwanted noise in a building in use is often a symptom of poor design-team and management integration, especially with respect to, for example, telephones and computers (often a source of noise, but often not part of the decision-making in a fit out).

Means: Less can be more

This is the renowned design dictum: seek simplicity, make intrinsically efficient options the essential features and beware of excessive technological complexity creating unnecessary and unwanted burdens for users and managers.

Figure 7: Real-world research

Solving problems	rather than	**Just gaining knowledge**
Predicting effects	rather than	**Finding causes**
Getting large effects	rather than	**Relationships between variables**
Looking for robust results and actionable factors	rather than	**Assessing statistical significance**
Developing and testing programmes, interventions, services etc.	rather than	**Developing and testing theories**
Field	rather than	**Laboratory**
Outside organisation	rather than	**Research institution**
Strict time and cost constraints	rather than	**As much time or finance as the project needs**
Often generalist researchers	rather than	**Typcially highly specialised researchers**
Little use of "true" experiments	rather than	**Much use of "true" experiments**
Multiple methods	rather than	**Single methods**
Oriented to the client	rather than	**Oriented to academic peers**
Viewed as dubious by many academics	rather than	**High academic prestige**

Source: *Reference 10*

Conclusions

This chapter has pulled together some of the threads of understanding user needs and preferences, drawing on evidence from mainly British-sourced studies and pointed to some strategic possibilities.

The best buildings from the users' point of view are usually perceived as comfortable, safe and healthy, with the intrinsic capability to respond rapidly when things go wrong or need to be changed. More often than not, the time dimension, especially responsiveness, seems to be just as important to the user as space. For example, if people spend too much time getting from place to place in the building, or the lifts have too much dwell time, then they will complain about it. They particularly dislike not being able to adjust or adapt conditions to suit their comfort preferences, especially when the requirement is seemingly trivial (e.g. the ability to move a VDU screen out of the glare of sunlight). As long as users have enough space, usable furniture and the layout does not interfere too much with what they want to do, then they say remarkably little about the architectural or interior features.

Users also do not like buildings or features that make them look stupid in the eyes of their peers. Overly pretentious or silly imagery (such as might be found in more 'way-out' modern workplaces) or intrusive technology (such as uncontrollable external blinds or automatic lighting systems which cannot be over-ridden) are almost always disliked.

Wastefulness is also frowned on (users - at least in the UK- do not like conspicuous waste or unnecessary extravagance). They like buildings which support them and what they have to do, not austenacious corporate or designer gestures.

This information has been assembled mainly from questionnaires using a "real-world research" approach (Reference 10 and Figure 7). Building performance studies do not thrive well in a "normal science" research framework because:

- buildings are rarely viewed as "total" human and physical systems, usually because this perspective does not map properly on to academic disciplines or government research agendas
- hypothesis-testing usually fails in the face of multivariate complexity (where it is hard to pin down cause and effect and contexts change from case to case)
- research findings are often too far removed from the practical needs of users, clients, designers and managers

Examining how people behave (what they do in response to real circumstances) works better than studies of normative requirements (that is, what people might do, or ought to do, given certain circumstances). Our approach is to stick to known facts about actual events.

As well as difficulties with research and methodology, there is too great a divide between the goals and perspectives of the supply-side of the construction industry and the demand-side. Clients are still too gullible. They often do not really know what they are procuring, especially the human costs and consequences, but also

the hidden costs of unnecessary complexity and the extra management required to keep things running smoothly.

The bottom line for many is usually about improving working conditions so that people respond positively and productively in their work. Our research suggests that perceived occupant productivity is reduced by about 20% in the worst buildings and improved by about 15% in the best - a difference of 35% between best and worst. However, only about one-third of the studied buildings have occupants who report productivity gains. (Reference 11) So there is still a big job to be done to get the basics right. Building users already know this. They don't like gratuitous design gestures or tokenism; they just want modest environments that are pleasant enough for them and do not get in the way too much of what they have to do. This is true the world over.

Notes and References

1. The Probe post-occupancy studies were published in Building Services Journal from 1997-2002.

For a full list of Probe publications and downloads follow the Probe menu item in www.usablebuildings.co.uk.

#0 P Ruyssevelt, W Bordass and R Bunn, Probe - Post-occupancy review of building engineering, BSJ 14-16 (July 1995)

#1 W Bordass and A Leaman, Probe 1: Tanfield House, BSJ 38-41 (September 1995)

#2 M Standeven, R Cohen and W Bordass, Probe 2: 1 Aldermanbury Square, BSJ 29-33 (December 1995)

#3 M Standeven, R Cohen and W Bordass,, Probe 3: Cheltenham & Gloucester Chief Office, BSJ 31-34 (February 1996).

#4 R Asbridge and R Cohen, Probe 4: Queens Building, de Montfort University, BSJ 35-41 (April 1996).

#5 M Standeven and R Cohen, Probe 5: Cable & Wireless College, BSJ 35-39 (June 1996).

#6 M Standeven, R Cohen and A Leaman, Probe 6: Woodhouse Medical Centre, BSJ 35-39 (August 1996)

#7 W Bordass, A Leaman and J Field, Probe 7: Homeowners Friendly Society, BSJ 39-43 (October 1996).

#8 R Cohen, A Leaman, D Robinson and M Standeven, Probe 8: Queens Building, Anglia Polytechnic University, BSJ, 27-31 (December 1996).

#9 W Bordass, R Cohen and M Standeven, Probe 9: Energy and Engineering Technical Review, BSJ, 37-41 (April 1997).

#10 A Leaman, Probe 10: Occupancy Survey Analysis, BSJ, 37-41 (May 1997).

#11 M Standeven, R Cohen, W Bordass and A Leaman, Probe 11: John Cabot City Technology College, BSJ 37-42 (October 1997).

#12 M Standeven, R Cohen, W Bordass and A Leaman, Probe 12: Rotherham Magistrates Court, BSJ 25-30 (Dec 1997).

#13 M Standeven, R Cohen, W Bordass and A Leaman, Probe 13: Charities Aid Foundation, BSJ 33-39 (February 1998).

#14 M Standeven, R Cohen, W Bordass and A Leaman, Probe 14: Elizabeth Fry Building, BSJ 37-41 (April 1998).

#15 A Leaman and W Bordass, Probe 15: Productivity in buildings: The Killer Variables, BSJ, 41-43 (June 1998)

#15B R Bunn, Probe feedback, BSJ 44 (June 1998).

#16 W Bordass, R Cohen, A Leaman and M Standeven , Probe 16: Marston Book Services, BSJ 27-32 (August 1998).

#17 W Bordass, R Cohen, A Leaman and M Standeven, Probe 17: Co-operative Retail Services HQ, BSJ 37-42 (Oct 1998).

#18 W Bordass, R Cohen, A Leaman and M Standeven , Probe 18: Portland Building, BSJ 35-40 (January 1999).

#19 Probe 19: Designer feedback, BSJ 35-38 (March 1999).

Bunn R., Real-world solutions, BSJ 27-32 (Aoril 1997)

Special Report Probe 3 (BSJ 18-20 December 1999)

#20 R Cohen, J Field and A Leaman, Probe 20: Barclaycard headquarters, BSJ 37-42 (Mar 2000).

#21 The Probe Team, Probe 21: Orchard Learning Resources Centre, BSJ 35-40 (July 2000).

#22 Cohen R., Bordass W., Field J., Leaman A. and Bunn R, Probe 22: Enschede Tax Office, Building Services Journal, 51-56, (November 2001).

#23 The Probe Team, Probe 23: Centre for Mathematical Sciences, Building Services Journal, forthcoming, June 2002.

2 Usability is covered in more detail in Leaman A., Usability in Buildings: the Cinderella subject , Building Research and Information, vol 28 no 4, 2000, 296-300.

3. Rapoport A., House Form and Culture, Prentice Hall, 1998 paperback edition. First published 1980.

4. Adams J., Risk and freedom: the record of road safety legislation, London Transport Publishing Projects, 1985,

5. Bordass W., Leaman A. and Ruyssevelt P., Assessing Building Performance in Use 5: conclusions and implications, Building Research and Information, 29, 3, March-April 2001, p 153.

6. Bill Bordass, first used in client presentation, 1996. Cited in Reference 11.

7. Leaman A. and Bordass W., Assessing building performance in use 4: the Probe occupant surveys and their implications, Building Research and Information (2001) 29 (2), 129-143

8. Bordass W., Leaman A. and Ruyssevelt P., Assessing Building Performance in Use 5: conclusions and implications, Building Research and Information, 29, 3, March-April 2001, p 154, from Figure 7

9 Design Brief Management was a postgraduate course that ran at the University of York from 1996-1998 until closed down by the university as part of its 'restructuring' of the Institute of Advanced Architectural Studies.

10 Robson C., Real-world Research: a resource for social scientists and practitioner-researchers, Blackwell, London, 1993.

11. Leaman A., Productivity Improvement, chapter 19 of Best R. et al eds, Building in Value, Volume 3, UTS Sydney, 2002.

Some of the papers cited here may be downloaded from www.usablebuildings.co.uk.