

Towards a user-centred theory of the built environment

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The building user's experience is explored as the basis for constructing a theory of the built environment. The first postulate of a user-centred theory is that the built environment exists to support the activities of users that it shelters. This theory, therefore, indicates ways in which we might learn more about this complex relationship; it also provides tools for measuring the degree to which the built environment in use is successful. Ways of approaching the users' experience of built space, and ways of measuring it to ensure that knowledge of the user-environment relationship grows, are described. Challenges to implementing such an exploration include defining users, agreeing on the meaning of experience, and organising if not delimiting what is included in the notion of built environment. The temporal dimension of space use is also a consideration. Drawing on extensive research on space-use in office buildings, a viable user-centred theory is developed in the context of one type of built environment. The user-centred theory enables links to be made between knowledge accumulated both at the micro scale of the users' experience and at the macro perspective of how the built environment is produced and delivered.

Keywords: building performance, built environment, occupants, social theory, theory, user experience, user-based theory

L'expérience des usagers qui occupent les bâtiments est analysée dans le but d'établir la base d'une théorie du milieu bâti. Selon le premier postulat d'une théorie centrée sur l'usager, le cadre bâti existe pour venir en soutien aux activités des occupants hébergés par celui-là. Une telle théorie nous offre des moyens permettant de mieux comprendre cette relation complexe et nous fournit également des outils pour mesurer jusqu'à quel point le cadre bâti est efficace. Il faut élaborer les façons d'aborder l'évaluation de l'expérience des occupants ainsi que de mesurer celle-ci afin d'acquérir une meilleure compréhension de la relation personne et environnement. Pour effectuer une telle analyse il faut surmonter les difficultés suivantes, entre autres: le consensus sur comment définir les usagers, l'accord sur ce qu'est l'expérience des ces derniers et l'élaboration de ce qui signifie le concept du cadre bâti. En outre, la dimension temporelle de l'usage de l'espace en est un aspect important. La théorie centrée sur les utilisateurs se concrétise en prenant l'exemple des nombreuses recherches effectuées sur les occupants des édifices à bureaux. Ce cadre théorique forge les liens entre la connaissance accumulée tant à l'échelle 'micro' de l'expérience de l'usager individuel que dans une perspective 'macro' visant la réalisation et la livraison du milieu bâti.

Mots clés: performances des bâtiments, milieu bâti, occupant, théorie sociale, théorie, expérience de l'utilisateur, théorie basée sur l'utilisateur

There are at least two ways to think about a theory of the built environment. One is exemplified in Thomas Mann's *The Magic Mountain* (1924), in which the world is viewed and represented through the eyes of one ordinary person in the confined world of a tuberculosis sanatorium. The micro-scale of this individual's

worldview provides all one might need to infer and articulate a theory of the universe. The other is exemplified in the famous quotation from Douglas Adams's *A Hitchhiker's Guide to the Galaxy* (1979), where the answer to the meaning of life, the universe and everything is '42'. Here the view is from a

macro-scale perspective: the way to form the theory is to take in everything.

It is tempting to take one or another of these two possible perspectives when identifying building use and users as the focus of a theory of the built environment, although one does not exclude the other (Kuhn, 1962). In the first instance, examples of approaches to built environment research that incorporate all stages of planning, creating, producing and occupying buildings include the Building Performance Evaluation theory advanced by Preiser and Vischer (2004), as well as Davis *et al.*'s (1993) approach to measuring building serviceability, Lutzkendorf and Speer's (2005) proposal for a building information system, and the Process Protocol approach (Cooper *et al.*, 2004), to name a few. This exhaustive and inclusive approach to a theory of the built environment has immense practical value: it is noteworthy that all these examples presume an underpinning and mostly implicit theory of the built environment in their orientation towards field measurement and practical applications.

An alternative approach is based on and lodged in the micro-perspective of the building user's experience; the reason, after all, that there is a built environment is the uses to which it is put. Current examples include evidence-based design – using data gathered from users *in situ* to identify solutions to specific design problems (Healthcare Design 90, 2006; Evidence-Based Design Symposium, 2006), as well as the neuro-scientific approach to architecture: how physical features in the environment affect brain processes (Eberhard, 2007); and post-occupancy evaluation (POE): the analysis of building functionality according to feedback from users (Zeisel, 2006). Some of the challenges and issues in constructing a user-centred theory of the built environment are explored in this paper.

What is a 'user-centred theory' of the built environment?

Since the built environment became a legitimate subject of research, theories of the built environment have

tended to be oriented to process – how it is created and supplied – and/or product – how it functions once it has come into existence. Typically, building users feature in such theories but are rarely central to them. This is likely attributable to the difficulties of measuring human behaviour and the limitations of conventional social science research in the practical context of planning, designing, building, managing and occupying buildings. As a result, user-centred theories have tended to be located somewhere along a continuum ranging between a deterministic definition of the environment–behaviour relationship, and one that minimizes the impact of the built environment on users (Hillier and Leaman, 1973; Lang, 1987). Figure 1 illustrates this theoretical polarity.

At one end is the extreme cause–effect perspective based on the premise that what is built, and the environments thereby created, cause users to behave in certain ways, many of which are predictable. Environmental determinism, while out of favour as a theory, tends to be favoured by members of the design professions, who see its immediate applicability to practice. A significant amount of research in environmental psychology is based on the environmental determinism paradigm, where efforts are made to identify how human behaviour is influenced by features of the spaces people occupy, whether this is at the scale of an urban neighbourhood or a door handle. Although not without value, as a user-centred theory this position is clearly simplistic, minimizing as it does all possible influences on human behaviour in a given situation that can themselves affect person–space interaction. The environmental determinism argument continues today in the ubiquitous form of user satisfaction as an outcome measure. Using the stimulus–response logic of experimental psychology, this approach posits that user satisfaction is a meaningful and measurable behavioural response to features of the physical environment. Little effort has been expended to understand exactly what users are reporting when they rate themselves satisfied (or not) with the built space they occupy, nor the influences of other, non-space factors on the 'satisfaction' that is being reported. Numerous other interesting and

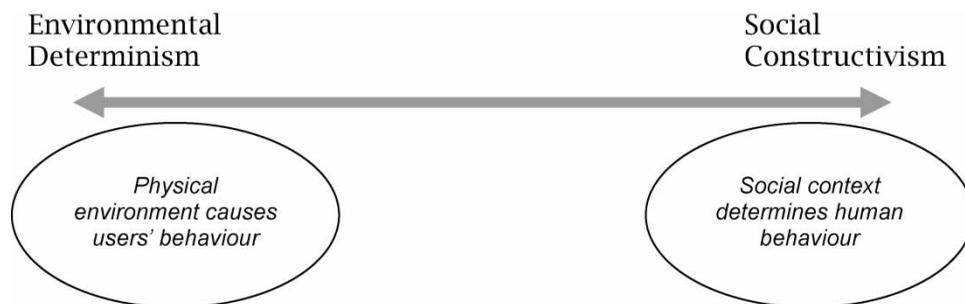


Figure 1 User-centred theories of the built environment

useful outcome measures of how humans occupy space – for example, appropriation, sense of territory, usefulness/usability, physical well-being, social interaction, competence, and legibility, to name a few – have taken second place to the generalist, global and inexact concept of satisfaction, which continues to dominate much applied environmental psychology research (Vischer, 1985). A later section discusses the value judgement implicit in the satisfaction paradigm.

At the other end of the continuum is social constructivism, inspired by the writings of the sociologist G. H. Mead and based on the premise that the human experience and therefore reality is entirely socially constructed and exists as a function of social and biological influences (Mead, 1962). According to this thinking, behaviour results from learned social norms and patterns and is not influenced by the physical environmental context in which it occurs. If the physical environment has any role to play, it is at a symbolic level and as a mediator of the social relationships that determine behavioural outcomes (Blumer, 1969). Those who invoke the constructivist perspective tend to cite the Hawthorne studies carried out at Westinghouse in the 1930s, which seemed to indicate that being subjects of a research study had a greater influence than changing light levels on task performance in a factory. But for today's built environment researchers, this too is a simplistic perspective, ignoring as it does what is now known about the importance of the effects of the built environment on users. Concepts such as defensible space, territoriality, space syntax, neighbourhood, and personal space are part of architectural language today, and the vast accumulation of studies of use of the built environment over the past 50 or so years bear witness to the widespread belief in the importance of our relationship to built space (Hillier, 2008).

What is clear, however, is that in spite of the unrealistic positions of each of these extremes, any user-centred theory of the built environment is likely to be located somewhere along the continuum between them. Human behaviour is influenced by the built environment in which it occurs – how could it be otherwise? – but it is not determined by it; and it is clear that in a given situation, building users' behaviour is influenced not just by the space they occupy but by their feelings, intentions, attitudes and expectations as well as by the social context in which they are participating. In this paper, a theoretical framework is outlined in which the building user's experience is central. While user-oriented (or user-sympathetic) theories tend to identify the user as one part or player in the built environment system, this framework argues that the user's experience of the built environment is central. It shows how the user's perspective provides insight into both process (how it is created) and product (its impact, once built) theories of the environment. Studying the

users' experience offers a better understanding not only of how behaviour is influenced by the environment, but also how users' act on their environment and how such behaviour redefines the user–building relationship.

The user-centred theory outlined in this paper is built around the two key concepts of the building user's experience and the user–building relationship, and – like all good theories – it must guide research and help accumulate both practical and theoretical knowledge. A better understanding of how we are all affected by buildings, and how this process of being affected and then affecting in turn the spaces occupied, pivots on the notion of use. Ultimately, this approach may help change conventional ways of planning, constructing, thinking about and occupying buildings and space.

Parameters of a theory centred on users' experience

The first challenge of a user-based theory of the built environment is how to define the parameters of the building user's experience. Conventional social science research specifies an analytic approach, in which hypothetical ways of linking features of the physical environment to measurable behavioural and psychological phenomena can be tested. Studies in this category may look at precise phenomena, such as the effect of variations in ventilation conditions on amount of sick leave (Milton *et al.*, 2000), or at less easy-to-define relationships, such as patterns of friendship and sociability on an urban street (Appleyard *et al.*, 1981), or how much satisfaction a given group of users express with environmental features with which they interact (Veitch *et al.*, 2003). The logic of these studies is predicated on identifying an outcome measure – absenteeism, friendship, satisfaction – and measuring how it is affected by changing environmental conditions. The cause–effect logic underpinning this approach – 'If we change this, people will do that' – comes perilously close to environmental determinism. Indeed, as anyone who has been a member of an architectural jury in schools or elsewhere can attest, this reasoning is beloved of designers intent on showing how the spatial arrangements they propose cause desirable behavioural outcomes in their users.

The deterministic framework, while seductive to researchers anxious to use a conventional analytic approach, fails to take into account the reality of human experience, which rarely conforms to simple cause–effect postulates. Researchers seeking a more comprehensive and dynamic basis for their theoretical approach, find the deterministic paradigm falling short (Clements-Croome, 2006; Hillier, 2008). Theorists seeking to advance more interactive and dynamic frameworks have proposed more complex frameworks

that aim to incorporate the mutually interactive effects of the built environment and its occupants. One of the early theorists in Environmental Psychology articulated the concept of the 'Behaviour Setting' as a unit of study, namely the micro-event or situation in which the use made of an environmental element was by definition part of that element and could be built on, such that a complex environment such as a school was formed of an accumulation of 'settings' where the place where the behaviour occurred is itself defined in part by that behaviour (Barker, 1968). This is closely connected to a *gestalt* framework, used to frame studies of how people move through space, for example, and how they simultaneously experience from within and observe from without the spaces they occupy (Perin, 1972; Thiel, 1997).

Others, intent on avoiding determinism and favouring a more interactive theory, have taken a systems approach to the building in use (Marans and Spreckelmeyer, 1981; Vischer, 1985), where the physical features of place and the actions of the user are interactive and mutually independent, but can be observed and described as separate and interdependent. Moving even further away from cause-effect relationships, the phenomenology of 'place' aims to dispense with any notion of duality and instead defines space or place in terms of the users experience only. Finding its roots in the Life Space theory of Lewin and the phenomenological approach developed by Moles, phenomenologists have focused on the quality of the users' experience in relation to place in both the built and natural environment, and its relationship to memories, emotions, and other psychological phenomena (Lewin, 1951; Moles and Rohmer, 1990; Altman and Low, 1992).

In spite of surface differences, what all these theoretical approaches have in common is the centrality of the user as operator, active agent and consumer of the built environment, and of the user's experience as the measure of its effects and effectiveness. Their emphasis on the user and the user's experience indicates that user-centred thinking is already well-established in studies of the built environment. However, no single overarching theoretical framework yet exists to create a coherent user-centred theory.

Defining elements of the user-centred theory

The first postulate of a theory centred on users' experience is that the built environment exists to support the activities of users that it shelters. The way to analyse, understand and evaluate ways in which it does this is to explore systematically and in detail the user's experience. This is a complex task. First of all, there needs to be agreement on who are the users. They may be carrying out activities inside the built environment, and they

might also be users of spaces created outside the enclosing architectural elements (gardens, streets, stairs, hospital rooms, office buildings, etc.). There is likely more than one homogenous user group in a given situation, and their interests may clash. For example, users of prisons include offenders – who would prefer more freedom of movement – and guards – who prefer that movement of the prison population be restricted – as well as visitors and administrative staff whose activities may not be considered at all.

There are also moral issues associated with defining users. Are gangs that use darkened urban alleys to attack and rob pedestrians legitimate users of built space? An ethical perspective must be applied to a user-centred definition of the built environment: some users have no merit because the use to which they put built space is immoral. Furthermore, one might have to determine whether or not some users should have more priority than others in ranking the relative importance of their activities. For example, are patients or staff more meritorious users in hospitals? Are children or old people more meritorious users of urban parks? Although contextual information will help make such decisions in practice, invoking ethical principles provides generic guidance within the user-centred theoretical framework.

Over the life of a building or built space, users may change. In North America, planned suburbs built in the post-war years for families with young children are now 'used' by a mix of young and old families, households without children, and older people who have a greater need for health services than for schools (Vischer, 1987). In fact, time is a factor in defining the built environment for all users. In office buildings, companies seek out the most flexible office layout to accommodate the ever-present moves and changes characteristic of modern business. Does one then need to anchor down one point in time to 'measure' the user's experience, and determine the degree to which user activities are supported or accommodated by the built environment? And if we agree to do so, then is the 'truth' of the user-built space relationship being falsified by finding an answer that only fits one point in time, thus fixing both user and environment and thereby rendering them artificial? These questions will be returned to below.

Second, if the users' experience is the route to learning about the built environment, one needs to agree on what is meant by experience. Many building use studies focus on sensory experiences, using methods borrowed from studies of perception and cognitive psychology. How do users perceive different features and conditions of the built environment, and how do they process the information received and make sense of it using memory and learning? Conventional perception studies tend to focus on one sensory mechanism at a

time; thus visual perception, auditory perception and sometimes olfactory and even kinaesthetic experience are studied. In doing so we fail to learn about the whole experience, to understand how users experience their environment when they are seeing, hearing, smelling and touching all at once. Efforts to do so are readily condemned as 'subjective' by conventional social science; but as qualitative methods become more sophisticated this may be the best route to understanding the *gestalt* of the user's environmental experience.

Third, one needs to decide how to define usefully the built environment. The phenomenological perspective places the user at the centre of a series of concentric rings starting with the immediate 'personal space' of the individual and enlarging out like layers of an onion to indicate semi-private or shared space, social space, public space, geographical space and universal space. Another way to identify the built environment creates an ontological debate about man and nature. While man and nature are typically defined in contradiction to one another, it is also understood that man is part of nature. Thus, the underlying ambiguity of any theory based on man versus nature arguments. Similarly, the user is by definition part of the built environment, and only separated artificially as a function of a need to apply a logic to questions about what it is and how it comes into being. But even if the user is experiencing the built environment as something separate from him, thus allowing one to study his experience, he is part of the built environment occupied by other users, and vice versa.

The user-centred approach must therefore address the complexity of the fact that the user-environment relation is dynamic and interactive. It is reciprocal: that is to say that part of the user's environmental experience includes the consequences of any user behaviour that may occur. The user is not a passive receptacle experiencing the built environment statically, as input. The user moves her chair, closes the drapes, paints the walls, puts up signs, talks, and in fact can be seen as continually acting on her environment. Thus, the user's experience of the environment is itself transformed by the activities she is performing in that environment, is in fact a continuing process of transformation.

An example: studies of environments for work

The next step is to connect a user-centred theory of the built environment to the macro perspective referred to at the beginning of this paper, in which each stage of the production, delivery, occupancy and disposition of the built environment is incorporated into a single inclusive theoretical framework. It is necessary to anchor and operationalize each of the parameters discussed above – namely, who the users are, what is

meant by experience, and how to define the built environment. Doing this creates effective links not only to the micro view focusing on the user's experience, but also to the macro view of the economic, societal and technological forces that affect how the built environment is created (Koskela *et al.*, 2002).

One way to do this is to focus on one type of built environment, thereby anchoring down who the users are, how time is defined, and what is meant by the users' experience. However, an issue that arises in reviewing research on users in environmental categories such as housing, offices, libraries, parks and the like is the evaluative connotation of results. Studies that measure outcomes such as user satisfaction *ipso facto* pronounce on building quality: users feel positive about good-quality built space, whereas if they are 'dissatisfied' the place under study is not performing or has somehow failed. An effective user-centred theory needs to be clear about what is being measured when users are asked about their experience of the built environment. Measuring the occupants' experience provides information both about product – how spaces affect behaviour in different situations, the effects of building systems on comfort – and about psychological processes – how people feel about and respond to the spaces they occupy, as well as about process. The implicit evaluation of built space – of quality – that is inherent in users' judgements links the user-centred approach to the process, that is, the macro approach that encompasses the supply side. Feedback from users can and sometimes does inform the design, construction, management and disposition of buildings.

The environmental category proposed in this paper to help focus on one type of built environment is work-space. User studies of work environments show how a user-centred theory can be applied to the knowledge that has resulted from research, as well as indicate how current and future studies might be guided by a theory centred on users' experience. Moreover, feedback from users of office buildings can be applied to supply side decisions to ensure that the user's experience is represented in the process of building delivery.

To refer to the previous discussion, how are the users, the built environment and the users' experience to be defined in the context of workspace? Users can be relatively simply defined as the people who come into the building on a daily basis and carry out more or less the same types of activities while they are there. They do not all do the same work, but their activities resemble and relate to each other. They are organized hierarchically in most organizations, with some having managerial responsibilities all the way up to the executives who run the organization. Others perform skilled technical and administrative work; and a small number are in unskilled positions performing mailroom and janitorial duties. Some organizations that interact with the

public include visitors as building users. Other users might be the office cleaners and maintenance staff. Similarly, the built environment in which people work is to some degree standardized in the form of offices. Modern offices resemble each other in most areas of the planet, and the same kinds of activities take place in them, whatever their various shapes and forms. The users' experience in studies to date tends to focus on the interior environment and the conditions that affect user comfort. Because user satisfaction has little validity as an outcome measure for user-centred research – whether they like their offices or not is but one small and not necessarily useful datum in the context of the complexity of the user–building relationship – it is proposed instead that the built environment mediates between the workers and the tasks and activities they are there to perform. How it does this is as legitimate an object of study as how well it does it: the degree to which workers and other users are supported in their tasks indicates the effectiveness of the built environment they occupy. The notion of support incorporates not just receiving support from, but also being able to act on the environment to achieve a desired, supportive result. The inverse is also true: where workers' have to struggle to perform their tasks because the built environment is problematic, the built environment has failed. And this may be attributable to any number of possible causes in the long and complex chain of events that led to this organization being in this building at this particular time.

How is then one to determine how built space affects users' activities, as well as the degree to which users' activities are supported or not? Especially in light of the complex nature of the user–environment relationship which, as shown, transforms over time and as a function of mutually interactive effects. One response to this question is to go directly to users and question them on their own view and definition of their own experience, making use of subjective user experience and using an objective approach to doing so. The structure and form of the way users are approached and the data they are required to yield needs to be precise and standardized. The results yielded by this approach provide a rich and diverse basis for understanding the user experience (Vischer, 1996, 2005; Leaman and Bordass, 2001; Whyte and Gann, 2003; Zagreus *et al.*, 2004).

Although it has been argued that office building occupants can be considered a relatively homogenous user group, research on the user experience yields an important distinction in the way user feedback is applied to the question of environmental support. The unit of activity in an office building can be the individual or the work group (team). User–environment interaction is not the same for these two units. If the purpose of environmental support is better task performance, individual tasks depend on a different set of environmental characteristics than group or team tasks. Thus, simply in this

one example – the built environment of the office building – it can be argued that there are two if not three 'user' units: the individual worker, the team, and the organization (Vischer, 2007b). Identifying the organization as a legitimate building user provides an opportunity to make a connection between space use and organizational culture and goals.

Assessing the user experience

The next component of the theory is addressed through how the data on the user experience are assessed. Data yielded by assessment tools, whether in the context of post-occupancy evaluation, design and environmental quality indicators, or building-in-use assessment, can be analysed both for what they state about the users' experience as well as what they say about building performance (Craik and Zube, 1976; Gann *et al.*, 2003; Vischer, 1989). According to the theory, if users indicate that environmental features or conditions support people and what they are doing, the built environment is effective and functional: 'functionally comfortable'. However, users do not assess their functional comfort on the basis of simple physical comfort. They bring feelings, memories, expectations, and preferences into their assessment, and this increases the complexity of the outcomes being measured. Some of these psychological processes are personal and individual, but many are shared and indeed are a function of the values and habits of the culture in which we live as a society. Thus, as well as physical comfort and functional comfort, psychological comfort is included in the rating of how well the built environment performs. These three levels of environmental support form an analytic framework that can usefully be applied to the three units of user: individual, group and organization, as suggested in Figure 2.

In situations where workers do not feel supported, and indeed have to make an extra effort to 'deal' with

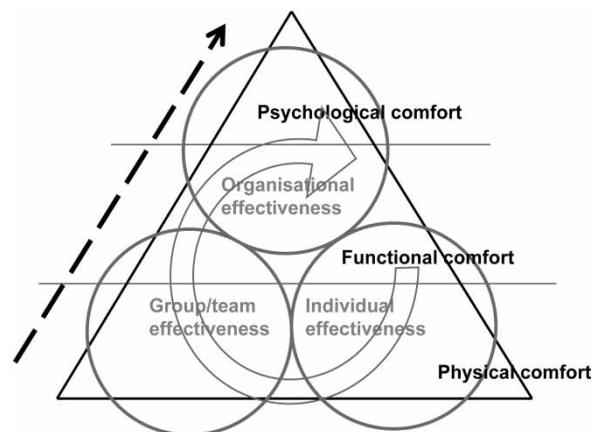


Figure 2 Analytic framework for assessing the user's experience

environmental barriers or problems in order to get their work done, the lack of support may be considered stressful. Work environments can be physically, functionally or psychologically stressful; the definition of stress in this model is the degree to which users have to compensate and expend their own energy performing their activities in adverse environmental conditions (Vischer, 2007a). Any and all built environments can be placed somewhere on the continuum ranging from completely functionally comfortable to completely dysfunctional and stressful, using feedback from users at a given point in time.

To summarize: the building user is at the centre of this approach to a theory of the built environment. Users are defined according to their use of the built environment, and thus the users' experience becomes a measure of its effectiveness – one might say, quality. User units in an office building are the individual worker, the team or workgroup, and the organization. Each interacts with the built environment at a different level and thus the measure of environmental effectiveness varies for each unit. However, unlike some more complex built environments, such as prisons and hospitals, these user units are not necessarily in conflict nor do priorities have to be set on their relative importance. Indeed there is considerable overlap in the 'built environment' each one occupies.

The heuristic value of the user-centred theory is evident in the ways in which its applications in research suggest and generate other kinds of built environment research. Analysis of feedback from buildings users determines the degree to which the built space they are using supports their activities (functional comfort) and the degree to which they have to overcome environmental barriers (environmental stress) to perform their tasks. Once this assessment is made, the causes and determining events that have created the situation under study can be traced, yielding different kinds of data. Thus, for example, users who are uncomfortable with their indoor air quality may lead to studying the operation of the air handling systems. If these are, say, sized incorrectly, then finding out why may lead to procurement issues and supply chain research. More detailed feedback from users – such as whether they are concerned about odours, or warm or stuffy air – can orient research into measuring levels of contaminants in indoor air. If such analyses are systematically pursued, results will have value for researchers in construction and in environmental quality, as well as for engineers and project managers.

In another example, users may express discomfort about their office furniture that can be traced not to problems with configuration or layouts but to their psychological discomfort at being moved out of offices and into cubicles. Understanding this process is valuable to managers and corporate decision-makers, who may

draw on the experience to prepare workers better for future moves. And in a third example, feedback from users on privacy, a complex and ambiguous term, leads to drill-down studies with a more psychological orientation. Such research elucidates how workers define and use privacy in the built environment, how environmental conditions affect perception of privacy, and a greater understanding of likely meanings of this culturally loaded concept.

Over time the accumulation of feedback from building users provides useful insights into not only the relationship between office buildings and work performance, but also more generally into the ways individuals, groups and organizations use the built environment. One indication of a useful theory is its generalization. Can knowledge generated about how people use the built environment for work be useful in other contexts, either in relation to other building types – housing, health care, schools – or in relation to other theories of the built environment, such as Building Performance Evaluation, lean construction, or supply chain management?

A user-centred theory of the built environment that is focused on the user's experience incorporates the interactive effects of both how occupants are affected and how they act on and respond to the environment. As all buildings have users who are influenced by the spaces they occupy and who also act on them, the theory is widely generalizable. Moreover, the principle of a supportive user–building relationship should be – and is – applicable across a wide range of buildings and environments. As more becomes known about the conditions and dynamics of a mutually supportive user–building relationship, so this knowledge will in turn affect theories of the built environment that are not user centred. The weak link for many theories of the built environment is the failure to identify and account for the human use factor. As knowledge of the reciprocity between user and built space increases, this can be incorporated into financial, construction, ecological and technology-focused theories.

Using carefully monitored and controlled feedback from built environment users is an approach that can work in all buildings, even those in which users cannot understand and respond to questioning. In environments where users are not articulate, such as spaces occupied by very small children, animals, and people who are too ill or handicapped to provide data, their feedback has to be collected in other ways, such as observing users' activities on site and questioning key informants identified as valid spokespersons for the users themselves (such as parents, caregivers et cetera). This type of feedback is as valid and sometimes more so than feedback elicited by direct questioning. However, one may wonder whether all types and styles of feedback from users are equally valuable in

terms of assessing environmental support. It has been argued elsewhere that no type or style of feedback from users should be dismissed. However, the more carefully designed the tools for gathering and analysing reliable user feedback, the more valid the data collected and the more useful the results of the analysis.

Applying the user-centred approach

The user-centred theory of the built environment uses support to human activities as a measure of built environment effectiveness – or quality – and thereby assumes that inadequate support to users constitutes a negative situation. On the other hand, it is clear that a wide range of influences affect how users feel about and use space, including their memories, expectations, emotions and beliefs. All user units – individual, group and organization – are susceptible to non-environmental influences that affect the building–user relationship. Moreover, a space that supports one user group may work less well for another for reasons unrelated to features of the environment in question, because of the changing features of the users. For example, a different company may move into an office building that suited the previous tenants, and find it non-supportive. Or one user group may have different tools and resources from another; or individual users may be trained to perform different tasks, or have different characteristics such as age, gender and language. It is less reasonable in such circumstances to judge the built environment as failing than to assess the situation – that is, user experience in built space – as being at the negative or stress-inducing end of the quality or comfort continuum. In practical terms, this may provide a basis for intervening to change the situation for the better. As researchers, studying these situations adds to our stock of knowledge about the environment–behaviour relationship.

In this context, the knotty question of temporal change and its effects on the user–building relationship comes to mind. A generally held belief, not necessarily supported by empirical evidence, is that an effective or ‘good’ example of the built environment adapts to changing uses over time. This suggests that ‘quality’ is an attribute that ought to transcend changing times and uses. However, by using the example of office buildings as a way of pinning down unknowns such as how to define users, what is meant by experience, and how the built environment is defined, we are in effect disagreeing with this viewpoint. The user-centred theory asserts that time has a direct effect on how well built space supports users, that the relationship between users and buildings changes over time, and that each situation must be studied and assessed on its own merits. According to this point of view, changes in occupancy and occupants over time

generate ongoing renewal of the built environment experience that is being studied.

A key element in this viewpoint is discovering the constants of the user–building relationship. Expanding knowledge of how people generically use and relate to built space is a valid goal of this field of study. Such knowledge can be understood in and applied to any and all built environment contexts, but more work is needed for this to happen. If the conventional social science research paradigm is applied, one must learn to measure more than user satisfaction as the outcome variable and indicator of environmental effectiveness. There is more to learn about how exactly the physical environment supports the activities and behaviours it has been designed for, and more to learn about the stress caused in the human mind and body when the physical environment is not appropriate and not amenable to change. Applying an interactive systems framework to research yields more knowledge about how cognitive and perceptual processes affect the user–building relationship, for example, following up on the influence of the self schema as one determinant of how users feel about space (Fischer *et al.*, 2004). One area rich in theory but poor in empirical support is understanding the reciprocal effects on user units of acting on their environment and changing it, such that their experience of it is then itself changed.

And finally, is it appropriate to assess the quality of the built environment based solely on what users tell us? For example, some of the world’s examples of great architecture are appreciated by all sorts of people who have no experience as users and are unlikely to have any: the Taj Mahal, for instance, or Angkor Wat, or, more recently, the Sydney Opera House. These are examples of buildings beloved for reasons that have nothing to do with their original uses and users, although one could argue that today these examples of the built environment are effective because they are icons for specific places and they accommodate tourism-related activities.

The premise that the quality of the built environment can be assessed in terms of the support provided to users’ tasks and activities is applicable to most building types, provided that tasks and activities are broadly defined. It cannot be refuted that efforts in all societies and all eras to create a built environment have resulted from the felt need to accommodate specific human activities, from the caves and shelters of early man, to the churches, temples and cathedrals built for worship, to the composition of communities and land use planning; and in each of these built environments user activities being accommodated vary according to the unit of measure: individuals, groups and organizations. It seems unlikely that environments can be found that have been built not to accommodate human activities and for a purpose not related to human use.

It is difficult then to comprehend the reasons why contemporary systems of delivering the built environment appear to have lost touch with the user experience. A recent critique of the construction industry found it was characterized similarly in a number of different countries for its aversion to change, adherence to out-dated procedures and technology, emphasis on cost rather than quality, and lack of a service ethic (Barrett, 2007a and 2007b). Decisions about what, where and when to build in most modern societies are guided by conventional business drivers, which include market conditions, financial profit, construction processes and technology, and competitive advantage. In some instances, they are also driven by aesthetic (architectural) considerations, building codes and standards specifications (for example, hospitals), and, increasingly, by ecological environmental concerns; on rare occasions, they are driven by users' needs. User considerations are rare and unfamiliar in conventional building procurement processes, perhaps because they appear complex and elusive in comparison to the relatively simple and technology-oriented tools of the builder's trade. As a result, society often makes do with a built environment, the users' experience of which represents a continual compromise between what is needed to perform activities well and what is occupied, *faute de mieux*.

Developing the user-centred theory so that it can be applied to a wider range of building types and projects will increase environmental support for people's activities, and applying knowledge of the user experience and building feedback from users into the supply chain will eventually change the way the industry operates. Access to a transparent system for assessing built environments through the users' experience will generate information that should ultimately affect buildings' economic value. It is important, then to continue to develop and refine a user-centred theory of the built environment designed around the users' experience and the inherent reciprocity of the user–building relationship. As this theoretical framework evolves, so applications to the practical world of producing buildings will become more apparent. In addition, the costs, both human and financial, of trying to function well in environments designed for other purposes – or that are simply dysfunctional – will also become noticeably important, instead of being buried, as they are now, in stories of business failure, societal breakdown, and human error. Ultimately, we all share the same ideal: a positive and supportive built environment which enhances human activities and helps people fulfil their aspirations.

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