Usability: philosophy and concepts
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Abstract
The purpose of this paper is introduce basic principles and to stimulate further discussion about the philosophical and conceptual underpinnings of usability, to enable the development of robust theory and to support practical applications in the built environment.

The paper introduces the background to an international action research project, now in its seventh year. Research organisations from nine countries, together with industrial partners from different sectors, are collaborating to understand the nature of usability and user experience, to identify develop practical methods for improvement and to promote an inclusive, participatory approach to adaptation of the built environment.

Early work in the project focused on the dimensions identified in international standards that apply to the usability of consumer products – efficiency, effectiveness and satisfaction. Later work has identified other key concepts – context, culture, situation and experience - that underlie efforts to understand and improve usability in the built environment.

The paper concludes that usability is a cultural phenomenon that can only be improved through a better understanding user experience, considered as situated action in a specific context. The paper discusses practical implications for built environment professions and for the development of design and management processes and raises specific issues for usability research in the built environment.

Keywords: Usability, context, situation, culture, experience

INTRODUCTION

Background
A CIB working commission on Usability of Workplaces (CIB W111) has operated as an integrated network of researchers and practitioners since its inception in 2001. The network was originally formed as a task group (TG51) to investigate the application of an international standard on usability, previously applied in the evaluation of consumer products, to the built environment. A first round of exploratory case studies (2002/05) sought to investigate the applicability of usability concepts and techniques, adapt them for use in the built environment and to identify methods and techniques that would enable a more positive user experience in organisational settings.

Senior managers from leading organisations participate in the network, coordinated by the research-based partners, and are directly involved in the series of action learning workshops used the main vehicle for advancing the programme of work. These workshops provide the opportunity for sharing knowledge of user experience in the workplace and an independent review of practice and for sharing best practice. Host organisations receive feedback from leading-edge organisations and recommendations for improvement, many of which have been implemented.
The network has provided new knowledge for action on themes including user experience, feed-forward processes, and has explored the links between the quality of the environment, health, well-being and productivity in the workplace. Each case has introduced new appraisal methods and techniques. The network has provided the opportunity for cross-cultural collaboration and information exchange.

Academic partners also meet separately to reflect on the cases and workshops and to address philosophical, theoretical and methodological issues arising out of the work. This paper focuses on some of the conceptual issues that have arisen from the project.

**Basic principles**

The research network was created to understand and apply concepts of usability, and to provide a better understanding of the user experience of buildings and workplaces.

Usability, as generally defined, includes all aspects of the user’s experience when interacting with the product, service, environment or facilities. The W111 network is particularly interested in ‘user experience’ in an organisational setting - encompassing all aspects of the end-user's interaction with an organisation and its facilities and with processes of design and management (of the built environment).

At the outset of the work, the definition from the international standard on usability was adopted ‘….effectiveness, efficiency and satisfaction with which a specified set of users can achieve a specified set of tasks in a particular environment’ (ISO, 1998).

The definition suggests that a product’s usability is determined by 3 key factors:

- **Effectiveness** – whether users can achieve what they want to do with the product
- **Efficiency** – how long it takes them to achieve it
- **Satisfaction** – their feelings and attitude towards the product

These three factors were incorporated in a framework which guided the first series of case studies. From this perspective, the term usability describes whether or not a **product** is fit for a specific purpose (Arge, 2004). Usability, or functionality in use, is concerned with a building’s ability to support the user organisation’s economic and professional objectives. However, an important conclusion from the first series of cases was the recognition that increased functionality does not necessarily mean improved usability.

Reflecting on the cases, Jenso et al (2004) have suggested that the concept of usability of buildings can be approached in four ways:

1. **Criteria and parameters affecting usability**
2. **Usability from different stakeholder’s point of view**
3. **The time perspective**
4. **Workplace and context**

The particular interest of this group is the **user** point of view, as a key stakeholder perspective eg the patient focus in healthcare environments. From the user perspective, usability means that artefacts are easy and fast to learn, efficient to use, easy to remember, allow rapid recovery from errors and offer a high degree of user satisfaction. It also means bringing the user perspective into focus.
Broad conclusions about the nature of usability as a concept, applied to the study of the built environment, were drawn from the first phase of the work, conducted through a series of five case studies and associated workshops (2002/06). This confirmed that usability of the built environment focuses on user perceptions of the ease and efficiency with which they can use the facility – the workplace. It is a continuing process and not a (construction/workplace) project. There was agreement that usability is concerned with the effect rather than intentions or product - it is not Post Occupancy Evaluation (PoE) and is a time, place, context and situation bound concept.

Findings from the first phase of the project suggested that usability should therefore, be described as a phenomenon that is outlined by three characteristics:

The user and his or her knowledge, expectations and perceptions
The product, service, environment or facility, its characteristics and the functions it provides
The situation, tasks and goals in which the product is being used

The latter characteristic has received much less attention than considerations of the user and characteristics of the product and is particularly relevant in applying usability thinking, conventionally used to evaluate all kinds of consumer products, to the built environment.

These basic principles have continued to guide the work in the second phase of the project. A further series of cases studies and workshops has been conducted over the past two years, along with a series of research workshops to develop theoretical and methodological aspects of the work and to create a dialogue with a broader audience of researchers.

The second phase of the project has sought to address the need to consider usability and user experience of the built environment in the context of situation and culture. The second series of cases and workshops has been conducted in the past two years (2005-2008), is currently being analysed and will be reported and discussed at the research symposium, prior to confirming commitment to a third phase of the project.

PHILOSOPHICAL APPROACH

Philosophy
In a previous paper, Granath and Alexander (2006) laid the foundations for the development of usability theory, by highlighting the philosophical differences that underlie the usability perspective and differentiate it from the conventional position taken up by built environment disciplines.

The paper suggested that the reasons for discrepancies between the intentions of a built environment project and the outcomes, from a user perspective, can be found in underlying philosophical differences in approach. It was argued that the predominant, supply-led ways of thinking about, providing and managing facilities and delivering built environment solutions, fails to accord with the reality from a user’s perspective.

The current philosophical paradigm of design, taken as a tool to arrive at outcomes in terms of usability, is not true for its purpose (Popper, 1963). Time after time, current thinking to help us in arriving at usable solutions has been falsified by user perceptions of the reality.
The paper elaborates this criticism and also investigates an alternative paradigm that might be more potent from a usability perspective. It suggests that current thinking in design, provision and management of workplaces is dominated by a predominantly rationalist way of thinking. The paper investigates whether pragmatism, offers an alternative way of reasoning.

Current design thinking is, naturally enough, strongly focused on the artefacts that we design. The functions of those artefacts and their overall functionality are what we are aiming at.

Granath uses an example from food production to provide further clarification. ‘In Sweden, a cross-disciplinary research group was formed by the government to find out if organically produced food has a higher quality than normally produced food. Researchers cannot find any absolute evidence that it is so. In some cases it is, in some cases not. It is also questioned whether organically produced food is better for the environment and for animals in the production process. Also in this matter the results are ambiguous. In the Swedish context, the reason for this is that traditional food production has adopted many methods and philosophies from organic production that has resulted in high quality food to a normal price.

From a rationalist point of view, where we believe usability lies in the properties of the product, this would be a problem for those who produce organic food. But, those who buy organic food do not buy it only for its product properties and certainly not because of the price. For them the production process, the participation in something larger than buying food, their belief in doing something good for the future etc. is a part of it. From this point of view normally produced food can hardly be usable to these customers, despite price, taste or looks.’

**Problem definition and evaluation**

The paper concludes that the predominant ways of thinking are not effective in arriving at usable solutions for work environments because the problem definition and evaluation of outcomes are not made from the perspective of users, but rather dictated by the structure and thinking of the professions that deliver the solutions.

Fragmentation of the professions presents obstacles to arriving at effective solutions, leading to definition of the problems by those that deliver the solutions. Facilities in use are not fragmented in the same way as in their creation. The solution lies within the domain of those that deliver the solutions. A usable building can be achieved, even if a building is not the most effective solution of the problem.

Efficiency is often well considered in most design situations, but an efficient solution is not usable if it is not the most effective solution.

Evaluation of effectiveness is strongly related to the ability of being usable, as it is interpreted in the vision of the project, rather than being tied to the actual user situation. A solution can be perfectly usable in a theoretical situation but that is not the situation of actual use.

Satisfaction is the most difficult aspect for traditional thinking to respond to. Satisfaction may be achieved, to a certain degree, by effective and efficient solutions. From a pragmatist perspective, a solution is however not usable, if it is not used.
reason a solution is not used, although it has all the functional properties that could be imagined, might lie in the design process, in social and psychological relations, in cultural aspects or in the situation of problem definition, design, completion or use.

The paper suggests that a pragmatist approach is the appropriate point of departure for creating a usable solution. The pragmatist way of thinking means that usability is proved when, and only when, the solution contains artefacts that enables users and allows behaviour that is a desired change from an unacceptable situation.

In practice this means, defining the problem in the user context, defining the outcomes in terms of desired changes in behaviour, rather than through the use of artefacts. It means choosing strategies that support effectiveness and sustainability in use and defining the rules for the creation from a user satisfaction point of view, rather from the perspective of delivering efficient solutions.

This line of reasoning is however in its creation and will and should be questioned in all its parts. In that way we believe that something sustainable and useful will emerge. It is so far only an intellectual construct that has to be proven true in reality. However, if it in any way has an impact on our design behaviour, in such a way that we can change our design process, and hence have an impact on the design itself, it may promote the improved usability of workplaces in the future.

**KEY CONCEPTS**

From this philosophical perspective and arising from the discussion and analysis of the first round of cases and workshops, it is clear that levels of user satisfaction will differ according to cultural differences, context, expectations and the actual situation of use.

Four concepts have been addressed in work in the second phase of the project. Usability should be considered in a specific context (Alexander, 2007), as situated action (Fenker, 2008), as a cultural phenomenon (Lindahl and Granath, 2006), and as user experience (Alexander, 2007).

Further analysis and discussion of the case material is needed to provide a better understanding of the impact of these issues, to identify implications for further usability research and for the development of appropriate, practical tools and to fully understand the

These key concepts are presented in outline to stimulate further discussion at the workshop.

**Context specificity**

Buildings are typically considered independently from their organisational, urban, cultural context. A key finding from the case studies has been the need to consider buildings and workplaces in context in order to understand and improve usability.

Seen in an organisational context, buildings normally form part of a portfolio and are evaluated in terms of their asset value. The tools and metrics for considering the use value of buildings are less well understood and developed. However, the value added to the business, and the role of construction in this respect, has been the subject of considerable recent interest
in the United Kingdom (see for example, Evans et al, 2004, Hughes et al, 2004 and Ive, 2006).

In an urban context, buildings are part of the urban fabric and create the physical infrastructure for the development of communities. The need to consider cultural differences emerged from the cases and workshops, in terms of both region and ethnicity.

These inter-related issues are increasingly addressed in, for example regeneration literature which emphasises the need to build human and social capital and to develop inclusive approaches to development (Alexander and Brown, 2006).

Situated action

Through the cases, and through his contributions to workshops, Michael Fenker (Fenker, 2008) has argued for recognition of ‘situation’ as a key parameter in usability. The literature on situated action provides an introduction to the issues that arise from consideration of situations.

The notion that people's behaviour is contextualised and the situation is a very important factor in determining what people will do. In the extreme view, this is the idea that you can't generalise and predict people's behaviour from one situation to the next. Thus, this suggests an approach to usability which requires an understanding of each user's or, more commonly, each organisation's specific and detailed needs in designing artefacts for them by carefully examining how they work and how situational and organisational factors fit into that process.

The concept of situated action, introduced by Lucy Suchman (Suchman, 1987), refers to how people act in a situation and emphasises the interrelationship between an action and its context of performance (Chen & Rada).

For some, situated activity is not a kind of action, but is the nature of human interaction at all times, in contrast with most machines we know. This is not merely a claim that context is important, but what constitutes the context, how you categorise the world, arises together with processes that are coordinating physical activity. To perceive the world is to be acting in it, not in a linear input-output relation, but dialectically, so that what I perceive and how I am act co-determine each other (Clancey, 1993).

People's actions are influenced by the context of their specific situation. The last view goes a bit further by drawing on how a users perceptions of the situation and specific actions are continually working together to determine the next step. Every course of action is highly dependent upon its material and social circumstances focusing on moment-by-moment interactions between actors, and between actors and the environments of their action.

It is therefore vital to understand the inter-active nature of actions, amongst the actors and between actors and their environment, to understand perceptions of usability.

Cultural sensitivity

Lindahl and Granath (2008) have argued that the scope of an organisation’s and user’s activities are related to culture and context, and that usability is a cultural phenomenon. Thus there is a context and cultural aspect for built environment professionals to deal with. This is a challenge, as the current focus often is on cutting cost and making space use more efficient.
The usability work has sought to evaluate in an organisational context. Transformation of organisations, of which changes in the workplace are part, requires a better understanding of organisational culture.

Organisational culture, or corporate culture, comprises the attitudes, experiences, beliefs and values of an organisation. It has been defined as ‘the specific collection of values and norms that are shared by people and groups in an organisation and that control the way they interact with each other and with stakeholders outside the organisation.

Organisational values are beliefs and ideas about what kinds of goals members of an organisation should pursue and ideas about the appropriate kinds or standards of behavior organisational members should use to achieve these goals. From organisational values develop organisational norms, guidelines or expectations that prescribe appropriate kinds of behavior by employees in particular situations and control the behavior of organisational members towards one another’

Elements of user experience

The term user experience is now widely used, especially by major players in the ICT industry including Apple, IBM and Microsoft. They suggest that ‘user experience’ goes beyond mere usability by including such attributes as usefulness, desirability, credibility and accessibility. Usability is often depicted as a much narrower concept focusing on systems being easy to use.

However, usability as defined in the ISO standard and as used in this project defines and describes usability in the broader sense of the overall user experience. A conclusion from the usability project is that the user’s experience encompasses all interactions, and experience of this interaction, with the facilities and resources at hand.

This implies that, to get closer to the user, we need to step further than the core activities and the functions used for that. The focus needs to be on effects and not intentions. The recurring discussion about competence and knowledge workers in workplaces might however shift the focus. If the ‘complete’ worker is needed the setting for work needs to be defined in the terms of the user.

Recent revision of the international standards for usability has sought to clarify some of these issues, for example the perceived differences in the use of the terms usability and user experience. Usability is a consequence of the presentation, functionality, system performance, interactive behaviour, and assistive capabilities of the interactive system. It includes all aspects of usability and desirability of a product, system or service from the user’s perspective.

Approaches to briefing, design methods, evaluation tools and management techniques have been developed to address the deficiencies of conventional approaches, in an attempt to address the need to put the user at the centre of the process.

For example, Hudson (forthcoming) argues that much of the existing work on briefing is based on premises that it can be reduced to a rational process, it is part of a finite project, that the final outcomes of this project are buildings or other physical facilities and that user requirements have an external objective existence that can be captured in the briefing process.
He goes on to suggest that work on usability suggests that these premises are limited and that a new approach to briefing may be necessary. This approach might be characterised by an emphasis of briefing as creative exploration of possibilities rather than requirements capture, a focus on the social construction of requirements and their evolution over time and a focus on human satisfaction rather than physical facilities.

Similarly, new design processes are emerging, such as user-centred design and experience design. User-centered design (UCD) is a design philosophy and a process in which the needs, wants, and limitations of the end user of an interface or document are given extensive attention at each stage of the design process. In the user-centered design paradigm, the product is designed with its intended users in mind at all times. In the user-driven or participatory design paradigm, some of the users become actual or de facto members of the design team.

Experience design is the practice of designing products, processes, services, events, and environments - each of which is a human experience - based on the consideration of an individual's or group's needs, desires, beliefs, knowledge, skills, experiences, and perceptions. An emerging discipline, experience design attempts to draw from many sources including cognitive psychology and perceptual psychology, linguistics, cognitive science, architecture and environmental design, haptics, product design, information design, information architecture, ethnography, brand management, interaction design, service design, storytelling, heuristics, and design thinking. Another term for experience design is experiential design.

Other important concepts, such as narrative environments are emerging in recognition of the need to address these issues. A narrative environment is a space, whether physical or virtual, in which stories can unfold (in other words, anyplace). A virtual narrative environment might be the narrative framework in which game play can proceed. A physical narrative environment might be an exhibition area within a museum, or a foyer of a retail space, or the public spaces around a building - anywhere in short where stories can be told in space.

CONCLUSIONS

The purpose of this paper was to raise important philosophical and conceptual issues in the application of usability in the built environment in order to generate discussion in the usability research network and workshops.

Placing greater emphasis on user experience suggests a re-casting of the usability framework to efficiency, effectiveness and experience.

Considering these key concepts for usability has important implications for research: The development and selection of appropriate methods for research into user experience eg social anthropology and ethnological studies. Research strategies that respond to the nature of usability research with an emphasis on context specific, situated action

The work also raises important practical considerations for built environment professionals: How to create and manage a destination/experience How to design and manage to build human and social capital The need for innovative processes to integrate situated activities
Development of the facilities value chain to include user experience
This places new demands on practitioners and requires better knowledge of behaviour and social processes. If built environment professionals are to address workplaces in terms of feelings about it - new methods and techniques need to develop, what is experienced as usable in a specific context will be sought after.

There is a need of development of knowledge regarding how to design and deliver environments and services in different cultural contexts. There is a need for more innovative processes that support the changing organisations they work with.

Future methods and research need also to focus on management of the complex issue of efficiency of facility use integrated with efficiency in staff use.

Taking the aforementioned into account one might consider if a new and extended role is beginning to emerge. Practitioners might turn into a facilitating manager rather than a facilities manager (Lindahl and Granath, 2006).

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