Usability: managing facilities for social outcomes

Keith Alexander[1], Siri Blakstad[2], Geir Hansen[3], Per Anker Jensen[4], Goran Lindahl[5], Suvi Nenonen[6],

Abstract

The paper argues for the development of usability concepts, methodologies and tools, in considering the effects of the built environment from a user, organisational and community perspective, in order to have a positive influence on social outcomes.

Since it was formed over ten years ago, the CIB W111 on Usability has been exploring concepts, methods and tools, developed in the evaluation of all kinds of consumer products, applied to the built environment. In the most recent phase of this work, conducted over the past three years, an international network of partners has collaborated to focus on the usability of learning environments achieving their objectives through a series of case studies and associated workshops. The work has sought to identify and evaluate the ways in which users (and other stakeholders) in projects are involved in decision making about building use and the methods and tools they used to understand, as well as to design and manage the relationship between activities and places.

The paper describes and reviews the development of the field of research on usability. It concludes that the action and use of facilities is strongly related to experiences of the users and thus their possibility and will to perform. People create their own places in the facilities created by professionals and there has to be an approach that opens up for questions like what use and why do an organisation want a specific solution. If professionals and laymen could meet, understand and define the emerging properties of a workplace, they could better manage and design the facilities for improved social outcomes.

Interpretation and analysis of the built environment (and support services) based on how it is socially constructed will enable integration of organisational use and the facilities provided to arrive at an understanding of usability. The concept of usability brings the organisational space to the fore and by doing so supports the actions needed. The paper concludes that usability will not be fully understood without understanding the social constructs of the users – the organisational ecology of narratives or constructs.

Keywords: Usability, organisational ecology, facilities management, social outcomes

1. Introduction

Facilities are defined as tangible assets that support an organisation (CEN, 2006). As such, facilities are managed in an organisational context and the physical assets are embedded in a service to support achievement of the organisation's primary objectives i.e. they are

[1] Professor, Director; Centre for Facilities Management; Manchester, UK; keithalexander47@gmail.com.
[2] Adjunct Professor; Centre for Real Estate and FM; NTNU; Trondheim, Norway; siri.blakstad@ntnu.no.
[3] Assoc Professor; Centre for Real Estate and FM, NTNU; Trondheim, Norway; geir.hansen@ntnu.no.
[4] Professor, Director; Centre for Facilities Management; DTU; Copenhagen, Denmark; pank@dtu.dk.
[5] Assoc Professor; Construction Management; Chalmers Univ; Gothenburg, Sweden; goran.lindahl@chalmers.se.
[6] Research Manager; Built Environment Services; Aalto University; Helsinki, Finland; suvi.nenonen@aalto.fi.

business support services. However, whether in the private, public or third sector, facilities should benefit stakeholders in the organisation, in communities and in society.

In the public sector and in social enterprises, social and environmental objectives are explicitly identified and managed. Increasingly, in the private sector, companies now recognise broader corporate responsibilities, not as an optional marketing strategy (as in CSR), but as an essential element of business success, In response, new concepts such as creating shared value (CSV) are being developed, with the need for new ways of evaluating the benefits derived by key stakeholders (Porter, 2011).

The paper reviews the development of the field of research on usability from the last decade. The recent work has focused on how users and other stakeholders are involved in decision making about buildings-in-use and in projects and the available methods that support this.

The paper argues for the development of usability concepts, methodologies and tools, in considering the effects of the built environment from a user, organisational and community perspective, in order to have a positive influence on social outcomes.

2. Usability of facilities

Usability is an intriguing challenge for architects, designers and facilities management (FM) as it concerns how a space, an artefact, is used and the effects of that use. It is an equally challenging concept for managers and organisational strategists as it includes the physical setting in which an organisation performs its activities. This makes usability of facilities a topic at the centre of the relationship between what we do, how we do and where we do it.

Since it was formed almost 10 years ago, the International Council for Building Research and Documentation (CIB) working group on usability (W111) has been exploring concepts, methods and tools, developed in the evaluation of all kinds of consumer products, applied to the built environment (Alexander, 2005, 2008a, 2010a). In the most recent phase of this work, conducted over the past three years, an international network of partners has collaborated to focus on the usability of learning environments achieving their objectives through a series of case studies and associated workshops. They sought to identify and evaluate the ways in which users (and other stakeholders) in projects were involved in decision-making about building use and the methods and tools they used to understand, as well as to design and manage, the relationship between activities and space.

A starting point was the definition of usability in ISO9241–11 (related to the “Ergonomic requirements for office work with visual display terminals”) as “the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use” (ISO, 1998). Usability in the built environment is context dependent, a product of user experience related to the social relations amongst users and to the interaction between users and facilities (Fenker, 2008). Usability has been found to be strongly related not only to relationships between people and physical settings, but also to clear strategies for the organisation of work and the use of facilities. The approach of looking at buildings as a means to fulfil strategic objectives and not only as a way to house people and activities is supported by the work of Becker and Steele (1995), Horgen et al. (1999) and Grantham (2000).

The research has enabled broad conclusions to be drawn about the nature of usability as a concept and its application in the built environment and has challenged the basis of conventional approaches to briefing and post-occupancy evaluation. In summary, the group sees usability as “a cultural phenomenon that can only be improved through a better

understanding user experience, considered as situated action in a specific context" (Alexander, 2008b). Here we elaborate the concept of usability, discuss practical implications for FM and for the development of management processes and raise specific issues for usability research in the built environment. We argue usability as a core concept for managing organisational ecology.

3. Changing the perspective

Studies of the usability in the built environment originate from the field of FM and other disciplines e.g. cognitive psychology, where the focus and interest have shifted from a technical perspective on building quality to the actual use of buildings. This shift represents a significant change from looking at buildings as end products and measuring their technical qualities and functional performance to looking at buildings as a means for the occupying organisations, or core businesses in the prevailing language of FM, to achieve their overall goals and objectives. Another consequence of this shift has been for buildings to be regarded as artefacts that interact with organisational processes and information technologies rather than defined objects (Gjersvik & Blakstad, 2004a, 2004b; Fenker, 2008; Nenonen & Nissinen, 2005).

Much recent effort in construction research in Europe and the UK has been focused on creating a client-oriented, knowledge- and value-based industry. Interest in considering the client and user perspective has increased. A growing number of international research networks have recently been established, including various working groups of CIB. CIB concerns construction and built environments, and many working groups take a sectorial perspective, i.e., they are concerned with the actors in the building process rather than the users of the output, the building. A sector-based perspective is clearly needed in order to develop and stimulate innovation in a field such as construction. However, the logics of use must also be recognized as a governing factor for the planning of facilities rather than a focus on professional knowledge to determine what is most appropriate or what is best practice. The most recent CIB workgroup (W118) was created as a clients and users forum. This is a step towards trying to understand this relationship, albeit in a project context.

However, CIB W111 is the only group that focuses specifically on a user perspective. The application of the concept of usability in the built environment presents a number of key challenges to conventional construction and property perspectives. Nine characteristics of a usability approach have been identified and contrasted with, for example, conventional built environment approaches (Jensen, Alexander & Fronczek-Munter, 2011):

1. User focus—usability puts a focus on the user and the organisation rather than the building.

2. Demand driven—usability recognizes the dynamic requirements of organisations (and communities), derived from the strategic objectives.

3. User experience—usability is primarily concerned with the perceptions of users rather than the intentions of designers and service providers.

4. Contingency quality—usability is contingent on user values rather than an inherent function of the built environment.

5. Context of use—usability considers facilities in the context of use rather than as a project (context of action).

6. Process oriented—usability is considered as a process rather than as product or service provision.

7. Service production—like all services, facilities are co-created by service users.

8. Relationship management—usability implies changing relationships with users.

9. Learning process—usability exchange of knowledge amongst users, managers and service providers.

These characteristics are rooted in a pragmatist philosophy, ultimately derived from Peirce (1905), starting from what works well is what is worth achieving. This is also based in the work of Dewey (1977) and his development of activity-based pedagogy where theory, practice, reflection and action are connected. This approach is based on the development of knowledge derived from use, which is what understanding usability also is about. It is the effect of what is done that is at the core of usability, not the specification of what functions shall be performed. Elsewhere, Granath and Alexander (2006) reflected on some of these theoretical aspects of usability research.

4. User experience—the core of usability

If use is what happens, how do we grasp it, understand it and deal with it? There must be ways of describing and thereby understanding the effects of use; otherwise, it cannot be communicated and reflected upon. Fenker (2008) describes usability as a process that can only be understood as a social construction where the building acts as a sort of stage. According to him, “the artefacts are bearers of a set of possibilities and constraints as well as, most importantly, activity and social practices.” Alexander (2010) argues for greater emphasis on user experience and suggests reconsidering the original triumvirate of efficiency, effectiveness and satisfaction to substitute experience for satisfaction. Recent work on service design and space management draws upon work about experience design (Shedroff, 2011). So far, there is a lack of ability to combine subjective, often qualitatively described user experience with objectively defined standards and requirements of built environment. The user experience is based on individual perceptions and they cannot be objectively measured. However there exist various ways to capture the knowledge of user-experience and create descriptions of the non-measurable, intangible conditions. (Nenonen et al., 2012)

This development is also denoted in service management, where customers’ experiences rather than specification of service gain more importance. Ultimately the customer is considered a co-creator of the service experience. The use of facilities has the same characteristic; we as humans interact with it. Alexander (2012) extends this thinking to consider the co-creation of value in FM, whilst Jensen et al (2011) relates it to the concepts of user driven innovation and co-design and to the idea of lead users (von Hippel, 2005),

One approach to explain the concept of usability in a way that makes it easier to understand and use for practice is presented in the USEtool handbook (Hansen et al 2011). Usability can be understood by focusing on:

- For what? What objectives should be achieved? And what activities actually take place?

- For whom? It is important to define which user groups are in focus, as there are several potential user groups to take into account.

- Where? Users' experiences should be related to space or place. In usability evaluations there is a need to relate users' experiences to specific physical surroundings. The definition of usability clearly underlines that usability is dependent on context and specified users' perception and experiences

- Why? Discovering factors that enhance/inhibit effectiveness is not sufficient. The next step is to understand why. This is essential when the knowledge acquired is to be applied in order to generalize and provide knowledge for the benefit of later projects, or to improve existing solutions.

Usability evaluations are based on different user's experiences and assessments on how well the buildings perform regarding different parameters. A building's performance can never be seen or understood in isolation from an organisational and technical perspective, as those aspects interact and influence each other. Discussing use implies a view on who is the user, and one has to be critical of conventional concepts of users. Olsson, Blakstad and Hansen (2010) suggest a tendency to oversimplify the way that users are addressed and challenge the predominant assumption that there is only one group of users. They identify categories of users and their roles at different stages of the building life cycle. They highlight different user roles and perspectives at different project phases. The perspective that is applied determines which user groups are included in a planning process or discontinuities in user involvement. In a usability perspective, different tools for usability analyses may be needed when studying usability from different user perspectives. This opens up a debate on value beyond value management and it brings culture and governance into the discourse. Who is a user and why are they a user? Whose needs and interests should be at the core of usability analysis and guide possible design?

Themes that have been central to usability research were reflected in the chosen theme of the CIB work group W70 on FM conference in São Paulo— FM and the Experience Economy—following Pine and Gilmore's (1999) seminal work in service marketing. Da Graca (2010) argued that this should now be the focus of FM responsibilities and stressed the need to open the way to demand management focusing on the user experience. Professionals working with facilities need to understand user behaviour, user needs and user experiences and need to manage and systematize the user experience. There is a need to learn how to understand and design experiences as good FM briefing leads to effective design. There are necessary tools but they need to be put to work. He suggests that research in this area is essential and that FM practice should focus on the user experience, looking at the demand side, managing experiences and putting the resources to work.

This challenge is illustrated in a study following the implementation and use of tools for usability evaluation in FM and Corporate Real Estate organisations. Blakstad and Hansen (2012) found that this had limited effects on practice in most of the organisations they studied. There where however exceptions. The cases with the most successful implementation, which had actually led to new practice and new "contexts of use", had used the most resources on implementation, and continued the research relationship with the researchers to develop own staff with competence to carry out the evaluations. The study suggested that focus on usability in practise can only be drivers for development in cases where key players have awareness and competence, and where the need for change is seen as urgent enough to justify the amount of resources needed to both analyze the situation and implement the change.

Contingent user values are not easy to explore using conventional techniques such as post-occupancy analysis, and there have been calls for multi-method approaches (Blakstad,

Hansen & Knudsen 2008) and a greater range of methods for understanding user experience (Alexander, 2008a). This is highly important as there must be methods that manage to bridge from the facilities professionals, architects and engineers to the everyday user without imposing professional knowledge in such a way that the user's perceptions are depreciated.

5. The usability brief—a key instrument in facilities management

Much recent effort in the research has focused on developing tools to operationalize the usability concepts, particularly for briefing and evaluation. To date, those who work in the building industry have not been sufficiently interested in evaluating the use of buildings they have helped to create. Does the building function as intended? Are there problems related to function or room use? How efficiently is the building utilized? How satisfied are the users? By not evaluating the use of buildings through asking such questions, vital opportunities for improvement and for coming up with new solutions have probably been missed.

Traditional briefing	**Inclusive briefing**	**Usability briefing**
Concerns new building/construction	Concerns all client/user needs in developing facilities	Concerns user needs in existing facilities
A definite phase at an initial stage of construction	A continuous process with changing focus in different phases of building life cycle	A continuous process at different phases during occupancy
An expert based information collection	A guided learning and dialogue process	A co-learning process
Users mainly involved as data sources	Users actively involved as part of a corporate change process	Users as co-producers
The result is a brief, i.e. a requirement specification	The result is acceptance of solutions based on a brief	Brief as an evolving 'bulletin board'

Table 1: Traditional, inclusive and usability briefing

A usability perspective has consequences for methods used in design and planning today. Briefing has been highlighted in several studies as a bearer of clients' and users' needs and requirements and a key instrument in getting what one wants. The recent work by CIB W111 on usability has similarly highlighted the importance of briefing as a means to achieve usability. Jensen et al (2011) have compared the characteristics of the concept of usability briefing with traditional briefing and so-called inclusive briefing In Table 1.

However, these findings raise a further series of issues and a possible agenda for future research and have interesting implications for the way we think about briefing, particularly when usability is seen as a contingent quality rather than as the inherent functionality of the physical environment.

Hudson (forthcoming) argues that much of the existing work on briefing is based on premises that it can be reduced to a rational process, that 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 the usability work suggests the limitations of these premises and argues that a new approach to briefing may be necessary.

This approach might be characterized 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. The professionals' capability to integrate and translate becomes important here and implies a responsibility to manage user needs and feed them forward to the subsequent project without losing the understanding of the social processes from which the facilities have emerged.

6. Usability appraisal—how to understand and interpret the use of facilities

Usability evaluations are based on different user's experiences and assessments on how well the buildings perform regarding different parameters. By considering a building as a tool, we should be interested not only in how the building itself functions, but also how the building impacts value creation in the user organisation. The user organisation should ask itself: what do we want to achieve? What do we want the building to contribute? How can our premises create added value for the organisation? We have seen that many user organisations have little awareness of those aspects. Instead a building is merely seen as floor space or workplace, without much consideration: a return for the rental. For instance, a business that wants to stimulate co-operation and learning should be interested in how the workplace supports these goals; a kindergarten that wants to encourage involvement by the children should consider how the facilities promote their mastery of their environment. Over the past 5 years, a EuroFM research group has explored the concept of added value of FM, with a strong connection to the CIB W111 Usability group (Jensen et al. 2012).

For building owners and users, an increased focus on usability represents both a challenge and an opportunity. The challenge lies in the fact that the user organisation may want quick changes and a high degree of customization to achieve maximum effectiveness. If not handled wisely, this may result in unnecessary tailoring for tenants, which can drive costs up and be difficult to change later. In this type of situation it is essential that solutions are flexible so that they can readily be changed as needs change. At the same time, an increased focus on effectiveness represents an opportunity for building owners and FMs, as having expertise and premises that can contribute to increased customer satisfaction may be an advantage.

A building's performance can never be seen or understood in isolation from an organisational and technical perspective, as those aspects interact and influence each other. Hence, usability is complex and has been described as a "wicked problem" (Blakstad et al., 2008). Such problems are characterised by no definitive formulation of solutions, and they are open to multiple interpretations (Rittel & Webber, 1973). The solution is simply the one that in a certain context is most satisfactory. According to Blakstad, addressing "wicked problems" requires multi-method strategies using a triangulation of methods and evaluations with multiple perspectives.

This aligns with findings from studies showing that evaluations work best when they are based on several methods and aspects, depending on objective, purpose, focus, competence and resources (Frechtling, 2002). All this implies that usability evaluations are complex, that there is a need for simplification and that the evaluator possesses both theoretical and practical knowledge and skills (Baird, Gray, Isaacs, Kernoghan & McIndoe, 1996). Blakstad et al. (2008) describe how different methods and tools were explored and

tested according to their relevance and validity for evaluation of usability in several Norwegian cases. An important discussion is whether the results or findings from those evaluations can be considered as valid and reliable, and whether context dependent knowledge from usability evaluations can be feed forwarded to new projects or be generalized and added to a more generally applicable body of knowledge (Hansen et al, 2010). One may always discuss the external validity of qualitative methods. According to Halvorsen (2008) the main question is not if results may be generalized but if knowledge can be transferred to other settings. As pointed out earlier, few of the available methodologies aim directly at evaluation of usability related to organisational objectives. However, they found that many traditional research and evaluation methods had potential to be developed for the purpose of usability evaluation.

Hansen, Blakstad and Olsson (2012) review usability evaluations and the feedback on users' experiences of their environment. The value of such evaluations for feed forward into new projects or improving existing facilities lies mainly in the ability to understand users' experiences and to translate them into adequate products and solutions. Consequently, the results of research related to evaluation should be quickly and easily accessible to clients, designers, decision-makers and others involved in the building process. At its best user feedback provides a learning process for different stakeholders. Kärnä et al. (2009) stress the importance of a systematic approach and of continually improving the flow feedback.

7. Usability of learning environments—a thematic focus

Over the 10 years of W111 research the working group has compared case studies from different sectors, first of all focusing attention of the usability of workplaces and then broadening to include industrial, educational and healthcare environments.

From 2009 to 2011 the work of CIB W111 on usability has mainly focused on the usability of learning environments (Alexander, 2010a; Arge, 2010; Jensen and Oesten, 2010). The lead was taken by the UK, in collaborative work with the Centre for Effective Learning Environments (CELE) at the Organisation for Economic Co-operation and Development (OECD), in a project to develop tools for evaluating the quality of educational environments (EQES). Research by PriceWaterhouseCoopers (2010) concluded that school context must be taken into account when assessing the impact of a school building program and that, new buildings alone, are insufficient to change pupils' attitudes and behaviour. They suggest that the real challenge is to link the transformational agenda to changes in pedagogy and leadership in schools.

This view is supported by the Norwegian work on usability. One of the case studies showed a university college with a very high score on building performance and coloration between program and completed building, but still showed a lack of usability due to change in pedagogic, increased student number, lack of changing culture among the department. In another case we found a high degree of pride and high academic score among the pupils, in spite for a building performing really badly (Hansen et al., 2006).

Reporting on evaluation research conducted in the UK, Alexander (2010a) argued that school facilities should be considered in the context of the communities they serve and as a prime means of transforming education. Effective learning environments successfully combine appropriate social and digital environments with the physical environment (Beard, 2012). Creating quality learning environments, which are more broadly accessible in the community, can also play a catalytic role in regeneration. To improve usability, the parallel processes of pedagogy and facilities planning must be reconnected, users must be empowered and communities must be offered the opportunity of managing their assets. And

professionals must utilize a usability perspective concerning for whom and why. The majority of conventional evaluation methodologies, particularly Post Occupancy Evaluation (POE) and Practitioner-focused Facility Evaluation (PFE) methods and tools, fail to address strategic objectives, consider buildings out of context and tend to focus on the characteristics and performance of the physical environment, rather than on the effects on users and on benefits realization. The evaluation of schools must take account of three key dimensions according to their role in the development of sustainable communities, in educational transformation and in the quality of the learning environment.

Assessing the usability of learning environments against these criteria, using appropriate research-based methods and tools, will require the development of new skills. It also suggests the need to develop different relationships amongst key actors in co-production processes. This is a challenging agenda for the FM of learning environments.

The objective of FM is to provide the setting and services that support the effectiveness of organisations that contribute to the development and creativity of the occupants and provide community benefit. The key is establishing the strategies and processes that connect effective utilisation of the physical, environmental and human resources to create positive outcomes for all stakeholders, through the whole life of the facilities. Stakeholders include owners, occupiers and operators of the facility, all service users and providers, the local community and representative agencies.

Seen in this way, FM is the brokerage of processes amongst all stakeholder interests and between stakeholder constructs. Myerson (2012) and Vischer (2012) argue that, in the experience economy, learning and co-creation are key processes. Elsewhere, Beard (2012) and Thomas (2012) describe learning itself as a complex process conducted via conversation, in a broad sense, including symbolic change and reflection or silent conversation and kinaesthetics.

8. Management for usability

Jensen (2010) has suggested that a focus on buildings in FM is concerned with how the corporate needs for facilities can be provided and optimized in both a short- and long-term perspective. Therefore, every phase of the life cycle of buildings is important. He proposed that continuous briefing and continuous commissioning are two interrelated concepts that, together with the concept of learning buildings, can be used to integrate the management of buildings and usability. Just as learning organisations need a specific form of management, where traditional hierarchical structures are removed and a shared vision is defined and accepted, so learning buildings need a similar specific form of management.

The management tasks to obtain usability include formulation of visions, strategies and requirements for the long-term development of buildings in the planning phase; involvement of users in defining needs and requirements and deciding on design solutions in continuous briefing; and on-going monitoring of performance and usability to capture new needs and requirements for changes during the use phase of buildings. In short, FM is about connecting use and space. FMs should be the obvious profession to take on this important management role in close collaboration with the top managers and users in the organisation.

9. Framework for use—a structure for discourse

Recent reflections on Nordic contributions to the usability research have led to the introduction of a framework – USE*frame* - to conceptualize contextual dimensions of usability. The framework is based on a perceived need to bring usability studies into one

structure and to relate what had been done in the different studies. This led to a discussion about a framework that also would enable the positioning of previous research by the research team members as well as the positioning of other research related to usability.

A framework developed by the research team is illustrated in Figure 1 and is further discussed by Lindahl, Hansen, Nenonen and Blakstad (2012). It illustrates steps in a process of understanding and mapping use to support action in projects or FM processes. It is a framework that can be used to describe processes as well as to map and relate projects or studies.

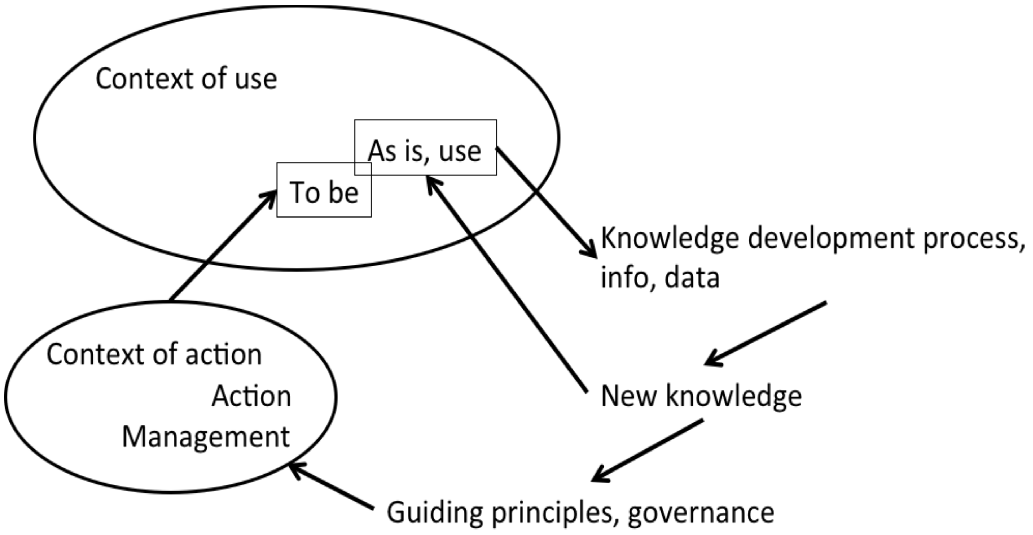

Figure 1 USEframe

A typical FM loop could be from “as is, use” via development of new knowledge, supported by the USEtool and back to daily use, i.e., to “as is, use” in “context of use.” This is an iterative process of change and possibly improvement. New knowledge can also be forwarded in a structured form, in a proprietary information system, to projects and action to create new workplaces via projects in the “context of action” domain. This then results in plans for new or changed facilities, the future use, “to be.”

Based on the research carried out in Nordic FM and usability projects we argue that there is a substantial amount of research and development (R&D) concerning facilities in use that already today allow for the possibility of sustaining usability of facilities. However, these are not clearly related and there is a mix between management-oriented research that focuses on the “context of action” and usability-oriented research that focuses on “context of use” and subsequent development of knowledge and briefing.

The framework USE*frame* provides a possibility to map and discuss this material (Hansen et al., 2012; Lindahl et al., 2012). With the creation of CIB W118 clients and users and the previous CIB workgroups W65 Organisation and Management of Construction, W070 FM and Maintenance, W096 Architectural Management and W111 Usability, understanding and delivering what the users need appears well covered. However, much of the research has focused on methods and processes.

While this is relevant, we already know that clear information, participation and knowledge dissemination is beneficial. While continued development of methods and processes is needed, there is also a lack of R&D of theory concerning users and their activities in the facilities the construction and FM sectors deliver. As much as researchers like to practice nearness in cases, there is now a need to step back and reflect in order to develop a theory to sustain the field of understanding the effects of facilities in use.

The delivery world of methods and processes has its own set of social constructs - i.e., it is one ecology; the user world is another. Usability research needs to think through the mind and narrative of the user world. Mental and cognitive maps are the source to understand this. Macdonald (2012) shows that, in a healthcare setting, strategic FM can be seen as a translation between the two. Higher usability was delivered by FMs who reached out to relate to the users and translated user requirements into appropriate service delivery.

10. Usability—managing facilities for social outcomes

The paper has argued for the development of usability concepts, methodologies and tools, in considering the effects of the built environment from a user, organisational and community perspective, as an essential approach for managing facilities for social outcomes.

On one hand usability has its significance in the relationship between people and building. On the other hand the usability is connected to various co-operation, communication and co-creation processes between different people. Nevertheless the usability research so far has been able to map and frame processes and methods in connection to usability of built environment. The service design approach provides more insights for capturing the user experience. Evidence for usability is based on user experience, may be linked to discussions on evidence based design, which may be seen as a way of designing based on actual use, i.e. evidence for what really works given a certain context.

This paper suggests that further research in the field of user orientation of the built environment is strongly needed. The overview of the area shows that there are many different approaches which vary in theoretical foundations, methodologies and stage of development, but they are in most cases not incompatible and they use many similar research methods. Further research should focus more on direct interactions with and involvement of users and mostly qualitative research methods are needed. It is important to distinguish between different types of users and apply methodologies involving users both as individuals and in groups and organisations.

Jensen et al (2011) have adapted the USEframe to make suggestions for future user oriented research (Fig 2) with a distinction between the three areas: Developing, Finding and Explaining.

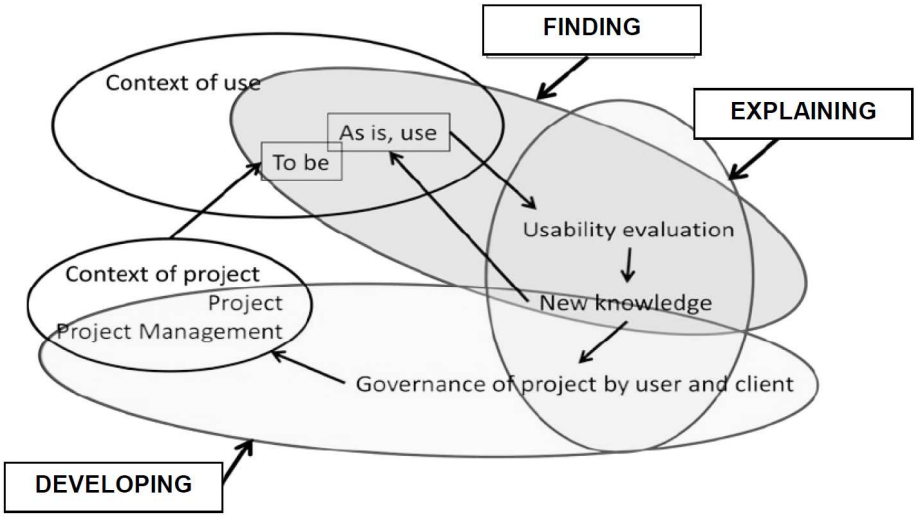

Figure 2 USEframe – cyclical processes

The development of knowledge and tools within USE*frame* will help structure the further implementation of usability knowledge and tools in practice. A crucial question is how

research can contribute to, on one hand, strategic/practical development in organisations and, on the other, the design and construction processes. USE*frame* illustrates this and aims to support discussion at the interface of research and practice. This will then also address the validity, reliability and generalizability of usability research.

References

Alexander, K. (2006). *Usability of Workplaces: report on case studies* CIB Report 906, Rotterdam: CIB.

Alexander, K. (2008a). *Usability of Workplaces - Phase 2*. Report 316. Rotterdam: CIB.

Alexander, K, (2008b), *Usability: philosophy and concepts. in Usability of Workplaces - Phase 2*. Report 316. Rotterdam: CIB.

Alexander, K, (2010a). *Usability of Workplaces - Phase 3*. Report 330. Rotterdam: CIB.

Alexander, K, (2010b). *The usability of learning environments, in Usability of Workplaces—Phase 3*. Report 330. Rotterdam: CIB.

Alexander, K, (2012), Co-creating value in Facilities Management, in Alexander, K and Price I *Managing Organizational Ecologies: space, management and organisation,* New York: Routledge.

Arge, K. (2010). *Evaluating quality in educational spaces.* Evaluation based on OECD/CELE Pilot Project. Project report. NTNU and Sintef.

Baird G., Gray, J., Isaacs, N., Kernoghan, D. & McIndoe, G. (1996). *Building Evaluation Techniques*. New York: McGraw-Hill.

Beard, C. (2012) Spatial ecology: learning and working environments that change people and organizations, in Alexander, K and Price I *Managing Organizational Ecologies: space, management and organisation,* New York: Routledge.

Becker, F. & Steele, F. (1995), *The High Performance Workplace: mapping the high-performance workscape*. San Fransisco. Jossey-Bass.

Blakstad S. H., Hansen G. K., & Knudsen W. (2008). Methods and tools for evaluation of usability in Buildings, in *Usability of Workplaces, Phase 2*. Report 316. Rotterdam: CIB.

Blakstad S.H. and Hansen G.K. (2012) Can Usability Evaluations drive Innovation. Paper to CIB W070, W092 & TG72 International Conference*: Delivering Value to The Community*, Cape Town, South Africa, January, 2012

CEN, (2006),EN 15221-1, *Facility Management — Part 1: Terms and definitions*, European Committee for Standardization

Da Graca, M.E.A., (2010), Preface: FM in the Experience Economy, in *Proceedings, CIB W70 Conference*, University of Sao Paulo.

Dewey, J. (1977). *Essays on pragmatism and truth, 1907–1909*. Carbondale IL: Southern Illinois University Press.

Fenker, M. (2008). Towards a theoretical framework for usability of buildings. In *Usability of Workplaces: Phase 2* CIB Research Report 316. Rotterdam: CIB.

Frechtling, J, (2002), *The 2002 User-Friendly Handbook for Project Evaluation*, Arlington VI: National Science Foundation.

Gjersvik, R., & Blakstad, S. (2004a). Towards typologies of knowledge work and workplaces.

in K. Alexander, B. Atkin, J. Bröchner, & T. Haugen, *Facilities Management. Innovation and performance,* pp. 137–153, Spon press

Gjersvik, R., & Blakstad, S. (2004b). Designing Knowledge Work Space: Archetypes of Professional Service Work as tool for change. In A. Carlsen, R. Klev, & G. von

Krogh, Living Knowledge. *The Dynamics of professional service work* (pp.140–163).London: Palgrave MacMillan.

Granath, J.A. and Alexander, K, (2006) A theoretical reflection on the practice of designing for usability, in *Proceedings EuroFM Research Symposium*. Frankfurt.

Grantham C (2000). The future of work. The promise of the new digital work society. New York, NY: McGraw-Hill, Commerce Net Press.

Hansen G K and Knudsen W (2006) Usability – A matter of perspective. The case of Nord Trøndelag University College. CiB W70 Trondheim International Symposium, *Changing user demands on buildings.*

Hansen G K, Olsson N, Blakstad SH (2010 a) Usability Evaluations – User Experiences – Usability Evidence. In: CIB Proceedings: Publication number 336. CIB W70 International Conference in Facilities Management. "FM in the Experience Economy", pp. 37–48

Hansen, G K, Blakstad, S H and Olsson, N O E, (2011), Usability Reviewed: summing up on Norwegian research on usability', Chapter 5.3 in Jensen, P.A. and Nielsen, S.B. (eds.): *Facilities Management Research in the Nordic Countries – Past, Present and Future.* Centre for Facilities Management - Realdania Research, DTU Management Engineering, and Polyteknisk Forlag,

Hansen GK, Blakstad S H and Knudsen W (2011) *USEtool. Evaluating Usability. Methods Handbook*. ISBN 978-82-7551-071-4. Faculty of Architecture and Fine Art, NTNU

Horgen, T.H., Joroff , M.L., Porter, W.L. & Schon, D.A, (1999), *Excellence by Design*. New York: John Wiley and Sons.

Hudson, J, (forthcoming), Briefing for Usability, in Alexander, K, (Ed.) *Usability in the Built Environment* (forthcoming).

ISO (1998) Guidance on Usability. International Standards Organisation 9241–11.

Jensen, P A, (2010), Management for usability of the built environment. in *Usability of Workplaces - Phase 3*, Report 330, Rotterdam: CIB.

Jensen, P.A. and Oesten, P. (2010). *Evaluation of Utterslev School. Research Report.* Centre for Facilities Management - Realdania Research, Technical University of Denmark, June 2010.

Jensen, P.A., Alexander, K., & Fronczek-Munter, A. (2011), Towards an agenda for user oriented research in the built environment. in *Proceedings 6th Nordic Conference on Construction Economics and Organisation*, April 2011, Copenhagen.

Jensen, P.A., van der Voordt, T. and Coenen, C. (eds.) (2012), *The Added Value of Facilities Management – Concepts, Findings and Perspectives.* Centre for Facilities Management - Realdania Research, DTU Management Engineering, and Polyteknisk Forlag, May 2012.

Kärnä, S., Nenonen, S. Junnonen, J-M, & Kuusela, S. (2009), *Framework and process for gathering feedback in the office buildings*. Proceedings of 5th Nordic Conference on Construction Economics and Organisation, 10-12 June, Reykjavik, Iceland

Myerson, J. (2012) in Alexander, K and Price I *Managing Organizational Ecologies: space, management and organisation*, New York: Routledge.

Lindahl, G, Hansen, G.K., Nenonen, S. & Blakstad, S.H., (2011). Facilities in use - Nordic studies about usability of workplaces. Chapter 5.4 in Jensen, P.A. and Nielsen, S.B. (eds.): *Facilities Management Research in the Nordic Countries – Past, Present and Future.* Centre for Facilities Management - Realdania Research, DTU Management Engineering, and Polyteknisk Forlag,

MacDonald, R. (2012) Dense networks and managed dialogues: the impact on the patient environment, in Alexander, K and Price I *Managing Organizational Ecologies: space, management and organisation,* New York: Routledge.

Nenonen, S., & Nissinen, K. 2005. Usability walkthrough in the workplaces— what, how, why, when. In Kähkönen (ed) Proceedings of 11th Joint CIB International Symposium Combining Forces, *Advancing Facilities Management and Construction through Innovation*, Helsinki 13–16 June 2005 (pp. 302–303). .Rotterdam: CIB.

Nenonen, S.,Koskela, H. & Kosonen, R. (2012). Towards The User Experience - Integration of the Measurable and Non–Measurable Conditions of Indoor Environment. Forthcoming in proceedings of 11th REHVA World Congress and the 8th International Conference on *Indoor Air Quality, Ventilation and Energy Conservation in Buildings*.

Olsson, N., Blakstad, S.H. and Hansen, G. (2010). Who is the User?, CIB Proceedings: Publication number 336. CIB W70, International Conference in Facilities Management. *FM in the experience economy*. Rotterdam: CIB 25–36.

Peirce, C.S. (1905), Issues of pragmatism, *The Monist* v XV(4). pp 481–499.

Pine, B.J., & Gilmore, J. H. (1999). *The Experience Economy*, Cambridge MA: Harvard Business School Press.

Porter, M.E. and Kramer, M.R. (2011). *Creating Shared Value: redefining capitalism and the role of the corporation in society*. Harvard Business Review; Jan/Feb2011, Vol. 89 Issue 1/2, pp 62-77.

PricewaterhouseCoopers, (2010), *Evaluation of building schools for the future (BSF): 3rd Annual Report*, London: DCSF.

Rittel, H.W.J. & Webber, M.M. (1973), Dilemmas in a general theory of planning, in *Working papers from the Urban and Regional Development*, Berkeley CA: University of California.

Shedroff , N. (2011). *Experience design 1.1 a manifesto for the design of experiences*. San Francisco: Experience Design.

Thomas, J. (2012), Creating effective learning environments: meeting the challenges in Alexander, K and Price I *Managing Organizational Ecologies: space, management and organisation,* New York: Routledge.

Vischer, J. (2012) Managing facilities for human capital value**,** in Alexander, K and Price I *Managing Organizational Ecologies: space, management and organisation,* New York: Routledge.von Hippel, E. (2005): *Democratizing Innovation.* MIT Press.