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Usability in the Workplace Case study of Pamela Youde Eastern Hospital, Hong Kong

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ABSTRACT

The paper firstly introduces the concept of usability in the workplace as an extension of the more commonly applied post-occupancy evaluation. Continuing the paper describes background information on CIB Working Commission W111 Usability in the Workplace before describing a recent case study based on the remodelling of an OR hospital theatre. Finally, reflections on the case study are highlighted, emphasizing the importance of effectiveness, efficiency and satisfaction when evaluating usability.

Keywords: Usability, Workplace, Health Care, Design, Participation

1. BACKGROUND

Over the past three years an international group of researchers and practitioners have conducted a series of six case studies to investigate the concepts and meaning of usability.[1] The common point of departure of the participants has been that, as a mixed group of practitioners and academics, all have been working with users of workplaces and work environments.

The work focuses on the outcomes of design and seeks to understand why despite the involvement of experienced managers and

1 Laboratoire Espace de Travail, La Villette, Paris, France , Norwegian University of Science and Technology (NTNU), Trondheim, Norway, Chalmers University of Technology, Gothenburg, Sweden, University of Salford, Greater Manchester, UK, VTT, Transport and Buildings, Helsinki, Finland and Hong Kong Polytechnic University, Hong Kong.

skilled designers of workplaces, and extensive research in design and briefing methods, post-occupancy studies and evaluation methods too often show that the resulting buildings cannot be used efficiently or effectively by the users / occupants. Previous studies have shown that these design outcome inadequacies have been reported by Gutman (1988, 89), Preiser (1995) and more recently by Hinnersson (2005).

2. RESEARCH PROBLEM

Building performance appraisal has typically focused on issues such as functionality, serviceability and accessibility. Building performance appraisal may also be extended to the design intentions through post-occupancy evaluation, (POE). In this way POE ideally identifies ways to improve building design 'fitness for purpose' by attempting to assess how well buildings match user' needs. POE generally uses direct user feedback as the basis for evaluating how buildings work. POE is typically used to fine tune a new building, manage 'problem' buildings and assist with the remodelling / refurbishment of existing buildings. However, both the assessment of building performance and POE tends to be post-design / construct activities with little or no input during the design phase. In addition, building performance measures and POE tend to treat buildings statically, ignoring the dynamic nature of businesses and organizations that inhabit the building's space. This is in contrast to the occupying organizations who consider buildings as workplace settings that are required to mirror the evolving nature of the organization's activities. Hence, to better understand workplace settings, the International Council for Research and Innovation in Building & Construction (CIB) recently established Working Commission W111 "Usability in the Workplace".

3. METHODOLOGY

The project adapts and develops a methodology previously used in an EU research project entitled Workspace (EuroFM, 2000), by working through a series of interactive 'best practice' workshops to consider the results of case studies of buildings-in-use. The workshops involve the participation of organisations, organised as clusters of 'stakeholders' to represent the interests of owners, occupiers and operators of buildings. The clusters are organised as action learning sets, providing the opportunity to share learning and experience in the business context of the case study organisations.

The overall project uses a multiple case study approach. An initial set of five case studies [2] have been carried out to test the adequacy of the

2 NCR, Discovery Centre, Dundee, UK, Örebro University Hospital, Örebro, Sweden, Old Mill Business Centre, Turku, Finland, Nord-Tröndelag University College, Röstad, Norway and Technocentre Renault, Guyancourt, Paris, France.

framework, survey methods and to identify the overriding issues, which are of concern to different stakeholders. These five cases have been reported in separate case reports. The data was assessed at the level of holistic cases (projects), embedded cases (incidents within projects) and through cross-case comparisons at both of these levels (Alexander et al 2004). The sixth case study at the Pamela Youde Nethersole Eastern Hospital (PYNEH) in Hong Kong is reported in this paper and will be further described in a forthcoming case report.

4. THEORY

Usability means making products and systems easier to use, and matching them more closely to user needs and requirements. Wikepedia describes usability in terms of "*denoting the ease with which people can employ a particular tool or other human-made object in order to achieve a particular goal. Usability can also refer to the methods of measuring usability and the study of the principles behind an object's perceived efficiency or elegance*." Usability research is typically associated with web design and 'Human-Computer Interaction', although it has more general applications related to making products more efficient to use. For example, it takes less time to accomplish a particular task. It is easier to learn – often by simple observation and, in terms of human psychology, imparting greater satisfaction in use. International standard, ISO 9241-11 also provides guidance on usability and defines it 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".

Usability is about:

- Effectiveness - can users complete tasks, achieve goals with the product, i.e. do what they want to do? Effectiveness has to do with the effect of something. Often we interpret effectiveness as the ability to reach target we have set up; to get the desired effects of something.
- Efficiency - how much effort do users require to do this? Efficiency is a term used in many contexts. Common to most meanings is that it, in some way, has to do with the ratio of a system's work output to its work input.
- Satisfaction – what do users think about the product? Satisfaction in common language has to do with being content, the fulfilments of a desire or a need.

Unlike POE or other existing methods to measure performance, usability cannot be evaluated simply on the product alone but also with respect to how the product is perceived by and interacts with the user. In turn the user also influences the product's effectiveness, efficiency and

satisfaction. For example, are the users highly trained and experienced, or are they novices? What are the users trying to do with the product and does the product support what they want to do with it? Finally, the usage situation (or 'context of use') and how the product is being used is also important. This implicates that usability is dependant on culture, context and situation and changes with time (Granath and Alexander, 2006).

5. THE PYNEH CASE STUDY

Recently the W111: Usability in the Workplace group completed a usability study in Hong Kong. The project related to an operating room (OR) remodelling project undertaken at the Pamela Youde Nethersol Eastern Hospital (PYNEH) in Hong Kong. The W111 team based their investigation on interviews with PYNEY management and staff in the specialist medical department, including those who participated in the remodelling exercise and users who did not. The team had previously noted that strategic organizational change frequently requires the need to reconfigure space and the concept of usability has been shown to be a useful adjunct to traditional methods for determining success.

Hong Kong's health services now face increasing demands for greater efficiency, higher resource utilization and innovation. PYNEH opened in 1993 under the management of the Hong Kong Hospital Authority. The hospital is located on the East Side of Hong Kong Island. It serves a population of approximately 600,000. The hospital has more than 1,800 beds, 3000 plus staff members and a total floor area of approximately 150,000 square meters on a land site of ten hectares. The mission of the hospital is, "*to excel in the provision of holistic, patient-centred, quality health care through loving, dedicated and cohesive team effort*". PYNEH acts as a role model in the health care arena following best practices, introducing new technologies and innovative projects in public hospitals of Hong Kong.

PYNEH recently pioneered a new operating theatre concept, the Minimal Access Surgery (MAS)[3] unit by creating the first integrated OR for both endoscope [4]and laparoscopic[5] surgery in Asia. The earlier technology made it sometimes necessary to conduct the endoscope diagnostic in a separate space and close the patient to have to reopen the patient at a later time in OR. Attendant with the increase in laparoscopic surgery procedures a whole array of equipment previously absent from the OR has emerged resulting in an uncontrolled proliferation of monitors, cables, tubing, and other equipment. These have typically been housed on large wheeled carts frequently overwhelming small operating suites that were not designed to accommodate this new technology. This can result in operative inefficiencies and safety problems for patients and staff. For example, the inability to place video monitors in the direct sight line of surgeons and OR staff may increase fatigue and potentially increase surgical errors. In case of emergencies, access to the patient by the anaesthetist and OR staff may also be suboptimal. Patient safety may also be compromised since equipment controls are frequently near the sterile field, making it difficult for nursing staff to access control in a timely and sterile manner. Finally the time spent in setting up for routine video procedures may affect the flow of OR schedules and decrease OR efficiency.

3 Also called MIS – Minimal Invasive Surgery
4 Endoscopy is a minimally invasive diagnostic medical procedure used to evaluate the interior surfaces of an organ by inserting a small tube into the body, often, but not necessarily, through a natural body opening. Through the scope one is able to see lesions and other surface conditions (Wikipedia).
5 Laparoscopic surgery, also called keyhole surgery (when natural body openings are not used), band aid surgery, or minimally invasive surgery (MIS), is a surgical technique (Wikipedia).

It was with this background that the PYNEH decided to reconfigure one of four OR. However, the new OR faced a number of critical challenges. For example, during the remodelling period – 5 months – the other three OR were required to function normally. In addition, the OR would be a unique facility in Asia with no known precedent. Hence the team had to adopt an "*invent it as you go along*" design methodology. Fortunately the champion behind the work, Surgeon Li, was able to bring together a strong team representing the clinical staff, the facility management group as well as, critically, the medical equipment supply company. The facility manager acted as the day-today project leader. Her task was made easier by the unique culture of cooperation that developed between the surgical team and those charged in doing the work. Fortunately the latter group was a relatively small team of individuals who had long experience of working together. Their relationship was based on mutual professional respect, shared trust expressed through patience, politeness and a willingness to ask opinions of one another. The final outcome of the project has been a resounding success. This is evidenced by the staff nurses commenting that the OR reconfiguration had significantly reduced their physical stress when handling equipment, had increased the OR equipment flexibility and most tellingly improved "quality patient-central care through teamwork".

6. REFLECTIONS ON USABILITY

All too often users have to adapt their working practice and operations to suit constraints imposed by the facility rather than the facility adding value to their business. In the case of the PYNEH OR project the remodelling work was designed to meet the users' objectives i.e. providing surgeons and nurses a meaningful, valuable and manageable workplace over which they have control, permitting them to operate at lower level of stress, with increased efficiency of working and hence improved productivity. Designed from the inside the project may be said to be a first for Hong Kong, a uniquely 'usable' space.

Looking at earlier experiences from the five European case studies there are parallels with the PYNEH design case. Part of the success in the PYNEH case was the close co-operation between core business and the team that designed and provided the new space. In the NCR case a method called Community Based Planning were used to involve the users of core business in the process. In the Örebro case, which also included design of a number of operating theatres, the user participated very explicit in the design of the units. Another parallel to the Swedish case is the close co-operation and the sense of shared commitment between all participants in the project. This is somewhat atypical for the Hong Kong hospital sector. On the other hand, the Örebro project followed long term official policy created through negotiation and legislation between the participants

The strong leading role the core business had in both the Swedish and the Hong Kong cases was important for the *effectiveness* of the new

operating theatre. The hands on involvment of the surgical staff in the design was important to the *efficiency* of the OR. Finally the close co-operation and shared comittment between the teams vauched for a *satisfactory* solution that supports usability both for core bsuiness and for the FM team that maintain the OR.

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