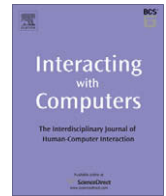




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Early traces of usability as a science and as a profession

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ABSTRACT

Shackel's paper [Shackel, B., 1991. Usability – context, framework, definition, design and evaluation. In: Shcaket, B., Richardson, S. (Eds.), *Human Factors for Informatics Usability*. Cambridge University Press, Cambridge, UK] is reviewed in an attempt to assess his contribution to the development of usability as a science and as a profession. Usability related research is first situated in the period around 1990. The contributions to usability as a science then are addressed via Professor Shackel's definition and evaluation of usability. Finally, his contribution toward usability as a profession is acknowledged via his view of usability in the light of wider business goals.

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1. Introduction

The past is a foreign country; they do things differently there – J.P. Hartley (1953)

Being asked to comment on the re-publication of Shackel's paper "Usability – context, framework, definition, design and evaluation" (1991) in this issue of *Interacting with Computers* devoted to celebrating Brian's life and his scientific accomplishments is a great honour and a big pleasure. It also is a task that I approach with some trepidation. Any attempt to assess fairly the significance of a particular paper for an entire discipline is no mean feat. It is probably impossible. Objectivity in such a task is illusory; reviewers inevitably bring their own perspectives, preferences, biases and prejudices to bear on the task, unable to "park their personal baggage conveniently at the front entrance". I will do my best to walk this tightrope in an attempt to highlight what I see as the paper's main contributions.

Re-reading Shackel's paper was like bumping into a dear friend from a distant past, picking up on a long forgotten conversation. The tone, the language alone was a stark reminder of where we were then and how far we have come – or not come – in the nearly two decades since the paper's publication.

Ask any undergraduate student today what a "dumb terminal" is, a "VDT", or a "microcomputer", and expect a blank look in return. Just think of the image the term "microcomputer" would evoke in a fresh young iPod mind of 2009. Then again, we still encounter seemingly antiquated terms like "user-friendliness" or "end-users" who, according to *Webopedia* (2008), are "individuals who use the product *after* it has been *fully developed* and mar-

keted... [*they are individuals who*] require a *bug-free* and *finished* product" [*italic emphases added*], and who it is implied have relatively little computer experience. The idea of novice users, or indeed any end-users, *requiring*, or *expecting*, *bug-free* and *finished* products, represents a utopian idealism, a form of wishful thinking long since dead.

Nowadays, everyone knows to avoid a version of any software application bearing the label "version X.0" precisely because these typically are all but wrinkle-free or finished in any sense of the word. The end-user in the above definition has no place in the design or development of interactive computer applications today. By contrast, in Shackel's definition the term refers both to the "end-user at the terminal" and to "the last person to be considered in the design of the system".

2. Usability around 1990

As one of the very early pioneers in user-centred design, Professor Shackel's mission is obviously both to include the [end-user into systems design and development and to move the user from being a mere "peripheral" to centre stage in the minds of system developers. His users thus are seen to participate actively in design (as in the Scandinavian tradition of participatory design, *Greenbaum and Kyng, 1991*), as well as to act as test participants. He does not elaborate upon users' roles in design, but concentrates primarily on their roles as participants in usability evaluations.

This is dictated largely by the paper's vintage, a time in which available choices in dialogue style, input/output modality/device, type sizes and fonts, colours, even the placement of text on the screen, were extremely limited. It also is predetermined by the implicit assumption that computers are desktop tools used by individuals working alone and completing well-defined tasks in static work environments. The widespread notions of Computer

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Supported Cooperative Work (CSCW), ubiquity, wearable, affective, mobile, entertaining, multimodal, and adaptable computers belong to a more recent past. From Professor Shackel's perspective, users were expected to provide information to the Human Factors (HF) expert who appears also to be the assumed user interface designer – not yet referred to as an information architect or an interaction designer.

At the same time, Laurel's books (1990a,b) imagining the computer as theatre and user interface design as an art already were beginning to inspire people from disciplines other than human factors, psychology, or computer science – to contribute to the now multi- and inter-disciplinary field of HCI (e.g., Carroll, 2003). The conceptualization of computers as designed to support activities other than "serious work" thus was beginning to take shape in some parts of the world.

3. Usability as a science

Rooted deeply in the tradition of human factors, Professor Shackel assumes that usability professionals and researchers all bring a thorough grounding in the human behavioural and social sciences. His version of human factors thus is the science of design, and especially evaluation, focusing on users completing particular tasks, using certain tools, in well-defined environments (e.g., Fig. 2).

Furthermore, while he advocates iterative testing, his process is firmly couched in a waterfall model approach (Boehm, 1988) in which usability testing per se begins to appear only during development. Professor Shackel recommends that subsystem sections be tested in "initial evaluation trials with samples of likely users". Thus, rapid prototyping techniques or the idea of testing even rough paper prototypes well before coding begins, were not yet perceived as standard usability activities. Users, tasks, tools, and usage environments/contexts remain necessary components of today's design, but these are no longer as predictable. Nor is it sufficient nowadays only to support user performance; users also want to enjoy interacting with aesthetically pleasing, emotionally stimulating, and playful computer applications, even if they merely support mundane work tasks (Lindgaard and Parush, 2008).

Today's users are technologically savvy. Without explicitly "requiring" particular features, looks, or usability levels, they do expect to be able to pick up, install, and use devices and software applications without fuss, without special training, and without the need to call tech support. Clunky technology remains underused or unused; ugly web sites are discarded before users are able to assess their usability or the quality of the information they may contain (Sillence et al., 2006). Users can select, and afford to buy, any number of mobile phone "skins" (e.g., Tractinsky and Zmuri, 2006) in colours and patterns to suit their attire – as well as select a range of ring tones to suit their personal taste and social context and to screen their incoming calls.

Without the active contribution of specialists representing an increasing variety of disciplines, it would be impossible to fulfil all of these expectations. As Buxton (2007) so aptly puts it, we are *not* all designers. Human factors folks excel at, well, human factors. The discipline is primarily about analysis, understanding, and bringing tacit knowledge to a level of awareness that makes it possible to optimize design, augmenting and supporting human endeavour.

In Professor Shackel's approach to design, he outlines usability activities throughout the entire process, but he also recognizes the danger in ignoring the technology-centred aspect of system design:

...the user must not be considered in isolation from other aspects of the situation; that would only be perpetuating in

reverse the all too common fault in the past of considering the technological tool in isolation from the user.

Thus, Professor Shackel skillfully embraces both the very detail of usability – from defining usability metrics, goals, and levels of performance in a specific type of application (Figs. 5 and 7) – to broad business-level concerns. The abundance of job types and titles contributing to design today testifies to increasingly nuanced definitions of job responsibilities. Yesteryear's HF specialist now rightfully shares the stage with many other professionals, making the process more fun and bringing challenges not imagined at the time of the publication of Professor Shackel's paper.

4. Definition and evaluation of usability

One of the most notable contributions evident in this particular paper is Professor Shackel's formal definition of usability, which he shows to have evolved from the work of Bennett (1984) (and subsequently finding its way into the version adopted in the ISO 9241/11, ISO (1998), standard. Thus, he defines usability as

the capability in human functional terms to be used easily and effortlessly by the specified range of users, given specified training and user support, to fulfil the specified range of tasks, within the specified range of environmental scenarios.

The emergence of two of the three pillars of usability – effectiveness and efficiency, as outlined in the ISO usability metrics – is clearly represented. Professor Shackel does not yet refer explicitly to efficiency as a stand-alone concept. However, in his outline of "development goals for usability of a system", references to errors and error recovery inherently addresses the issue of efficiency. Professor Shackel also offers a set of performance goals for what he calls his "proposed operational definition of usability"; these include learnability and flexibility, as well as effectiveness and subjective measures of attitude. Seen through today's eyes, the goals of learnability (and to some extent flexibility, at least as stated in the paper) are perhaps less relevant to contemporary plug-in-and-use systems. However, they do indicate the big variety of ways one may measure performance in usability evaluations.

The notion of attitude as specified in the paper appears in the "illustration of defining usability goals" (Fig. 6), but it is not integrated into Professor Shackel's definition of usability – as in the latter ISO (1998) version, in which it features as "satisfaction". In Professor Shackel's terms, attitude is grounded in the "human cost in terms of tiredness, discomfort, frustration and personal effort". He explicitly states that, provided this cost is not too high, "satisfaction causes continued and enhanced usage of the system" (Fig. 4). Thus, while Professor Shackel sees attitude as a precursor to user satisfaction, the user experience per se (or the joy or pleasure associated with it) is not yet represented.

It turns out that Professor Shackel is in good company. Across different domains there is agreement that satisfaction broadly represents an overall evaluative summary of a product, an experience, or a phenomenon (Teerling and Huizingh, 2004), that involves an expression (judgment) of the sum of one's feelings and attitudes towards a variety of factors affecting the situation to be judged (Betsch et al., 2001). Even today, the meaning of the term and how satisfaction should be measured remains evasive.

For example, a review of some 180 usability studies published between 1999 and 2002 found no fewer than 96 different terms attributed to user satisfaction (Hornbæk, 2006). While Professor Shackel's assumption that an absence of tiredness and discomfort will lead to satisfaction (and hence continued use of a given product) may seem a little outdated, the issue of satisfaction has not yet been resolved.

5. Usability as a profession

Shackel's vision of user interface design includes stakeholders other than users, designers, developers, and HF personnel, all of whom are seen to be active participants in setting usability goals. He notes that "it is essential that users and managers are fully involved in this specification process". Thus, a concern for, and understanding of, the need to situate human factors work in the context of wider business goals features prominently in the paper.

Papers were beginning to appear on the costs and benefits of usability (e.g., Karat, 1990), but the publication of Professor Shackel's paper still preceded the first edition of Bias and Mayhew's (1994) book on that topic, by several years. Many of those early papers were borne out of HCI teams' frustrations at usability activities being considered only at the very end of the product design and development processes – far too late for fixing the usability problems uncovered in usability evaluations. These papers typically aimed to provide HCI teams working inside large organizations with tools supporting their efforts to furnish convincing evidence for incorporating usability work in the entire process).

By contrast, Professor Shackel's vision and his reality was one in which attracting commercial contracts from outside organizations was an essential ingredient for survival of the very large and active HUSAT (Human Sciences And Technology) Institute (Gill, 1991). Thus, although not explicitly referred to in his paper, the early contributions of HUSAT (helping to shape the development of usability as a profession now flourishing in industry, Governments, and academia) should not be underestimated.

6. Concluding remarks

An attempt was made to outline several of Brian Shackel's contributions to HCI. Three notable examples were reviewed. First, his formal definition of usability that found its way into the ISO 9241/11 standard and its basis for the definition of usability metrics was mentioned. Second, his outline of quantifiable usability activities throughout the design and development of interactive computer systems is seen as advanced for its time. Third, Professor Shackel's understanding of usability in the context of wider business goals is seen as a contribution toward shaping the usability profession.

About the author

Gitte Lindgaard, PhD, is Director of the Human-Oriented Technology Lab (HOTLab) and a full professor in the Department of Psychology, Carleton University, Ottawa, Canada. She holds the prestigious Canadian Natural Science & Engineering Research Council's NSERC/Cognos Senior Industry Research Chair in User-Centred Product Design. Previously, she was Principal Scientist and Head of the Human Factors Team at Telstra Research Laboratories, Australia for many years. She was Chair of CHISIG of the Ergonomics Society of Australia (ESA) for many years where she

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