

CALL FOR PAPERS

Journal of Engineering Design

Special Issue on Interaction and Experience Design

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Even in the development of the most technologically complex products, systems and environments, it is now accepted that the role of the user must remain firmly in focus. It is not enough to fulfil functional requirements such as safety and performance, or to achieve technical excellence in manufacture. The emergence of user-centred design has been critical in shifting focus towards human needs in the design and development process. Inclusive design in particular has set out the importance of universal usability in the design of products, and this fundamental requirement has been addressed in a previous special issue of JED (Volume 21, Nos. 2-3, 2010). Broader user-based issues, however, require consideration of the emotional reaction of individuals to the tools, interfaces and spaces we interact with daily. The delivery of more personalised usage scenarios encompasses aspects of interaction design, psychology, culture and human factors to achieve satisfying, engaging and meaningful user experiences.

The aim of this special issue is therefore to address the emotional needs of users and their experiences in using engineering products, processes and systems. Some of the problems we posed included: What indicators can be monitored to best understand response during product use? Do requirements change through the ageing process with respect to motivation, learning and dexterity? How can tasks and activities be designed and sequenced to form compelling narratives of use? How can factors such as culture, personality, experience be considered in interface design? And can the tensions between tailored individual requirements and product universality be resolved in unifying design principles? While the papers presented in the special issue do not explicitly address all of these, they illustrate how we can connect industrial contexts, object proprietorship and physical operation with user experiences in a variety of settings.

Research in user-led design has matured in the last 20 years (Lewis, 2014) and now encompasses a number of fields including user-centred design (Redström, 2006), emotional design (Chapman, 2005, Norman, 2004), user experience design (Kuniavsky, 2003), inclusive design (Clarkson et al., 2003), haptics (Hara, 2007) and product interaction design (Moggridge, 2007). This is reflected in the strong human behaviour and requirement streams at academic design conferences such as the International Conference on Engineering Design, the Design Research Conference and the International Design Conference. Many of the journal publications and texts concerned with interaction design are, however, oriented around computer interaction and web design (Preece et al., 1994, Dix, 2009). And while other major design and engineering journals have periodically provided authors with the opportunity to discuss the implications of interaction in

the context of the design industry (Humphreys et al., 2008, Bilda et al., 2008, Mazalek and van den Hoven, 2009, Verlinden and Horváth, 2009), this special issue in JED provides a platform as the debate moves beyond fundamental usability issues to a deeper understanding of user experience and response in relation to engineering products, systems and service design. We acknowledge the strong inheritance of user research and invite new approaches in design interactions research. Lee (2010) argues that we have a shift in the core competences from user research towards complex multi-user systems where a crowd of people, not a single usage informs new design. In framing the call around human responses, our intention was to ground the issue in tangible measures (Mugge et al., 2009, Nagamachi, 1995) and ensure the applicability of findings across the engineering design community. Emphasising the experiential aspect of interaction will address concerns on the limitations of user-based approaches (Norman, 2005) and provide a platform for re-imagining interfaces in light of emerging technological developments and understandings of human characteristics (Wodehouse and Sheridan, 2014).

The call was circulated in May 2014 and we received 112 expressions of interest. This resulted in 57 submitted papers. Of these, 36 emerged for review and 5 were subsequently accepted for publication. While the rate of attrition reflects the strength of the reviewing process, it also highlights how challenging it can be to effectively bridge fields that have traditionally had very different philosophies, methods and terminologies. The papers we have selected illustrate how consideration of sensory input (Lu, 2015), psychological affordances (Camargo and Henson, 2015), and meaningfulness (Baxter et al., 2015) can be combined with the practical considerations of how products are configured (Ludden and van Rompay, 2015) and operated (Smith and Wu, 2015).

The first paper sets the scene for the special issue by explicitly linking interaction and the industry contexts. Lu focuses on experiences at work and in particular the design of tools to contribute to meaningful experiences. After providing an overview of mechanisms for meaningful work, they analysed 10 student-generated scenarios in tool design that were produced in conjunction with metal and engineering industrialists. Three of these are described in depth to provide illustration and the discussion provides insights on how we can find greater meaning in work situations via a Positive Design Framework for Work Tools.

The following two papers focus on user response, one on measuring affective response to physical features and the second focusing on the psychological issues related to product attachment. Camargo and Henson describe how Rasch measurement theory – more commonly used in medicine and psychological testing to model responses – has been adapted to identify appropriate compliance values. Using a packaging example, this work points to more effective approaches to obtaining reliable results from small user sample sizes.

Baxter et al. provide us with an examination of psychological ownership and the factors that lead to object attachment. Through the analysis of four objects, a set of sixteen affordance principles are identified and categories, with examples of how these are manifested in product configuration and operation provided. The principles established here can help inform conceptual design by highlighting how product features can affect attachment.

The final two papers are concerned with enhancing interaction by primarily utilizing touch, one providing a theoretical overview and the other focusing on practical application. Ludden and van Rompay draw on behavioural science to provide an overview of touch in relation to experience, before outlining three levels of product interaction (visceral, functional-behavioural, symbolic-reflective). Two case studies – a cell phone and a navigation bracelet – are then used to explore these. The first illustrate how weight corresponds to perceptions on quality and the second how tactile information can be used to communicate spatial information. The conclusions address the implications and how other modalities can potentially be brought to bear.

Smith and Wu on the other hand present a haptic keypad design that simulates the feeling of a traditional rubber-domed keyboard. The authors provide a state-of-the-art review in relation to kinaesthetic and tactile haptic devices, particularly in relation to keyboard interfaces. They also model the characteristics of a typical key depression before presenting studies on human sensitivity to vibrational feedback and preference in terms of a series of keyboard designs. While a promising technological development in itself, the modelling and analytical methods are of broader interest to interface designers.

It is our hope that the range of papers presented here offers an insight into the scope of interaction and experience design and how it can be harnessed to improve engineering design. We thank all authors who submitted to the Special Issue, and to those selected for publication in revising their papers to meet our requirements. In addition, we are extremely grateful for the time and effort contributed by all the referees who have assisted in evaluating the submitted manuscripts. Finally, we thank the editors of JED for providing us with a platform to highlight the importance of design interaction and experience. We hope that this special issue highlights how the human aspects of design are central to even the most technical design contexts, and look forward to further developments in methodology and approaches to incorporate these in design practice.

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