

Understanding Adaptive Design and User Experience

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ABSTRACT

This paper discusses my current doctoral thesis, focused on understanding open-ended systems and their implications for designers and developers. Computers are becoming more pervasive in peoples activities and as a result there are an increasing number of users who wish to alter and adapt technological objects to their own needs and requirements. Hence designers of interactive technologies are faced with the challenge of facilitating and enabling adaptive experiences rather than directing the user towards a specific experience of use. In this paper I examine these issues through a case study of narratives with open source software developers and examine how their practices can offer unique insights into designing open-ended systems for interaction designers.

AUTHOR KEYWORDS

Design practices, open-ended design, open source communities

1. INTRODUCTION

As computers become objects we live with, not just tools for work, the need to explore people's relationships with technology and what these relationships say about our humanity becomes more apparent [1]. The use of digital technologies in almost every aspect of our daily lives has vastly increased during the past decade. The rise of social software or Web 2.0 tools and the increase in popularity of sites such as *Flickr*, *YouTube*, *Facebook* and *mySpace* in addition to spread of information through various digital mediums such as blogs and wikis provide a rich and diverse range of user-submitted creative content. This spread of information and knowledge has led to a major shift in the conceptualisation of "users" from passive recipients of technology, to active participants that are able to reconfigure, personalise and adapt the technology to their own means.

As technology is increasingly being woven into the fabric of everyday life it is becoming widely agreed that the design of technologies for everyday life requires attention beyond traditional HCI issues such as usability and utility[2, 3, 4] and as a result interaction design is faced with new ways of interaction and engagement. In

contrast to closed systems, which typically create a sharp separation between the creation and use of the system, open-ended systems are designed to evolve over time, allowing users to make changes to functionality and assign meaning when necessary. Nurturing a change towards maintainable, open-ended design requires a questioning of how we perceive and understand society, and our role in it as consumers and makers of things.

Consequently, what we need in Interaction Design is to question and re-imagine our design of and interaction with interactive systems. One tactic for examining fundamentals within a field is to look outside the field - a practice HCI has embarked on in the past and one encouraged by the perspective of reflective HCI. My research seeks to expand on aspects of open-ended design by looking outside the discipline of Interaction Design to the Open Source movement. The rise in popularity of open source communities has provided access to diverse production models, communication paths, and interactive communities. The users within these communities have control over use and functionality of public collaborative systems and often build and tailor these systems to their own requirements. This open source model of activity and decision-making allows multiple interpretation of use and supports the different approaches and priorities of different users. This points to the fact that a wider trend moving away from the practices of traditional designer models, and towards a new user-led information-age paradigms, can be seen to be developed here. This shift is by no means complete at this point, however, and its implications are still emerging.

My thesis aims to investigate how practices and perspectives within open source communities could benefit Interaction Designers. By observing the ways in which users of open source technologies appropriate and build, we can gain new insights and perspectives for Interaction design where openness may form the basis for an approach to design that is essentially exploratory and has the potential to engage the user in richer more meaningful experiences. In this paper I will present an initial case study where a set of interviews were conducted with a series of open source developers and users. These interviews form the first step of my field studies that aim to explore how Interaction Designers can learn from alternative perspectives outside their own practice.

2. RELATED WORK

Arias et al. [5] argue that one of the fundamental challenges for Interaction design is to invent and design a culture in which humans can express themselves and

engage in personally meaningful activities [5]. However, a large number of new technologies are designed to see users as passive recipients of technology [5]. As designers, we recognise that the user interacts with technology not just in a functional task oriented manner, but also on a larger social and cultural approach to the activity and how we engage our users in reflection over their own understandings of technology opens up new options for users as well as designers.

According to Moran [6] everyday adaptive design is “a pervasive activity engaged in by people as they adapt resources at hand in their everyday lives.”

By allowing users to adapt and alter technical objects they become active learners and shapers. Moran argues given the life cycle of an interactive system, the majority of time and effort occurs after they are designed and built — setting up installing, maintaining, upgrading, etc. This phase “*is not just about using systems but about people actively adapting them to their needs*” [6]. Moran’s focus on the ability of end-users to modify systems is based on a long tradition of user-configurable systems such as the Xerox Buttons interface [7].

2.1 Adaptable & Tailor-able

Tailor-able systems allow the users to evolve their own personalized environment and can be seen as “*a process of users evolving the system gradually along with their own changing skills and requirements*” [7]. In the Xerox system users were able to directly access the functionality of the system. Administrative staff using the interface had a button that allowed them to add an item to an agenda for weekly meetings thus allowing them to work more efficiently. The buttons have an open nature and can be copied and reassigned new properties. MacLean et al. [7] argue for the development of a “*tailoring culture*” which would motivate users to think in terms of improving their environment and encourage members of communities to “*help each other by sharing insight and expertise*” [7]. Although tailor-ability can give users the ability to integrate and change components, Mørch et al., [8] argue even though the techniques of black boxing, variability, component-based subassemblies, and design environments have been widely accepted in software engineering and HCI; these environments are built for professional developers, resulting in shortcomings for users with little or low expertise. The high level of learn-ability associated with these tailor-able systems can be discouraging to users as composing higher-level components requires mastering a lower level of complexity and knowledge of how the system operates. The challenge to the Interaction Design community is to move beyond an emphasis on interaction that is solely based on access to information (work-oriented) and provide the opportunity and resources for design activities embedded in social debates and discussions (life-oriented) in which all people can act as designers if they choose to do so rather than being confined to a passive role as user.

2.2 Seamful Design

As part of his vision for ubiquitous computing, Mark Weiser suggested that we should take a pragmatic or even positive view of the characteristics of digital tools

and media, in terms of how they function in themselves, and how we use them with other tools and media: what he called seam-full design [9]. Barkhuus et al. [10] state “*a seam is a break, gap or ‘loss in translation’ in a number of tools or media, designed for use together as a uniformly and unproblematically experienced whole. Seams often appear when we use different digital systems together, or use a digital system along with the other older media that make up our everyday environment*” [10]. Therefore seamful design can be seen as exploiting characteristic limits and variations that are apparent in use and interaction, and which contribute to users’ practical understanding and use of a system as they experience it in their everyday life. Chalmers [11] suggests we indicate a product’s ‘seams’, in order that it might convey how it can be appropriated or adapted. Moran’s [6] argues that Interaction designers need to provide platforms not exact solutions as a way to encourage adaptive behavior. By overbuilding infrastructure and under building features it empowers users to reinterpret use and to play a role in the determination of meaning of systems. Moran argues that Interaction designers need to build with an architecture of layers, outer fast layers to change rapidly and enable learning, while inner slower layers enable stability and provide infrastructure for the user to build on. This implies that users will be actively engaged in the process of understanding both the system and its situation of use. Hence the challenge for Interaction Design becomes, not to decide upon and support a specific, correct interpretation of a system, but to incorporate and balance multiple, perhaps conflicting processes of interpretation in design and evaluation.

2.3 Ambiguous Interfaces & Objects

As technologically mediated experiences become increasingly common outside of the work context, designing for play, learning and awareness, to name a few, should be guided by creative principles and not necessarily by traditional human-computer interaction measures of efficiency and effectiveness that can result as an impediment to experiential interactive designs. Gaver et al. [12] put forth an alternative framework for design - ambiguity, that can be utilized in the construction of interactive designs that support awareness, learning and play [12].

Gaver et al. acknowledge that the concept of ambiguity should not be applied when designing interactive systems that have the goal of supporting specific tasks. Instead they state that interactive systems designed for non-work contexts should not constrain the users in their interactions as is typical in work-related, problem-solving applications, but rather engage them: “*By impelling people to interpret situations for themselves, it encourages them to start grappling conceptually with systems and their contexts, and thus to establish deeper and more personal relations with the meanings offered by those systems*” [12].

However ambiguity is not a persistent quality. Once an understanding of the object or situation before you are reached, the experience ceases to be ambiguous. However, people are not always so decisive - a fixed interpretation one day can become another the next day.

It all depends on the nature of the design. As McCarthy and Wright [1] point out, the wide range of issues relevant for design - aesthetics, emotions, personal and cultural values, and so on—are integrated in experience.

2.4 Some Reflections

From the literature presented here it is viable to deduce a set of lessons or guidelines that can be utilized when considering open-ended systems. Previous conceptions of the user radically limit our constructions of the user, which means embracing the idea that we do not need to define use in predictive detail. Therefore we need to acknowledge the role of another creative agent - the user - at a later point in the design cycle. This involves shifting away from what designed technology does for whom to what can be done with the designed technology. In open-ended systems the user is reconstructed as a creator of actions who precedes an identity rather than a user with an identity that prescribes actions.

Another aspect of open-ended systems should allow users to connect with one another or their environment. Instead of designing ways for the artifact to be used, the designer instead needs to focus on ways for the user to understand the tool and understand how to apply it to each situation. The designer's stance is revised, as the design is less directly "*present*" in the interaction between the user and the artifact. So in turn, this revised stance will result in a different set of design activities and concerns. In particular, the designer's attention is now focused on the resources that a design should provide to users in order for them to appropriate the artifact and incorporate it into their practice [13].

2.5 Learning from Open Source Communities

As Interaction Designers we often look outside our own community for inspiration or new ways of thinking about interaction design. Open-source users tend to learn by looking at a completed technology, taking it apart, working backward by breaking down the system into subsystems, and picking up the theory as needed. This style of learning allows them to discover previous methods of solving particular problems, seeing the solution used in a practical, real-world environment. They often work in close collaboration with designers developing work in a social collaborative environment. The design process for the open source user extends beyond the creation of an artifact and onto how the user experiences the creation of an artifact. By making technical systems suitable for a purpose and adaptable within that purpose, these systems allow the user to make the system one's own. New insights into Interaction Design gained from understanding users of the open source movement offer novel ways of experiencing technology, and alternative techniques of engaging with users.

3. PRELIMINARY FINDINGS

This section discusses findings from some initial field studies with users of various open source communities. A comprehensive approach that involved overlapping methods of inquiry (informal interviews, discourse analysis, workshop analysis, etc) was undertaken. The

findings discussed here are taken from a series of informal interviews and workshops that took place in September 2008 during Tweak festival. Tweak is an interactive art and live electronic music festival taking place in Limerick City which the author founded and curated in 2008. These initial field studies aim to provide a richer, more complete picture of the communication and appropriation activities in the open-source community. These accounts illustrate methods and approaches that these users take to continually shape systems to respond to their specific needs and settings by creatively appropriating artifacts and the surroundings. The accounts here aim to understand the experience of appropriation from the user perspective. Users of open source technologies have control over use of the system and how it fits and comes part of their life. The form and function, given by the user, are constructed from the user point of view. Hence the user's context and environment often form as inspiration for the object and how it should be used.

Twelve informal interviews were conducted with users of open source software and hardware consisting of open ended questions. These interviews were aimed at exploring the open source users understanding and experience of using open source technologies. These users also conducted eight workshops, which were aimed at exploring methods and approaches that open source users undertake in order to achieve their goal of hacking and creative programming. Workshop themes were broad in nature and varied from the role of electronics in music making to hacking and changing functionality of robots. All workshops were informal in nature and held in an open environment and were designed with a strong focus on participation. The workshop concluded with a discussion of how technological tools were used in order to help participants achieve their goals. These interviews aimed to address a number of key themes: exploration, adaptability, experience and boundaries of design. These themes are discussed and presented here.

"Just kind of testing, wandering around as anyone when they start software when they are a bit unsure"[Open Source Software User]. Feedback from the interviews suggested that users found the open nature of open source software explorative and confusing initially. When faced with the initial task of new software, users stated, *"You want to do lots of things but you don't know how."* Several of the users who were interviewed described accounts of learning new techniques by hacking bits of code and analysing how other users had applied the technology. Users described this exploratory stage as a necessary step in order to understand how the technology could be fitted to their needs.

The experiential nature of designing software and objects holds key insights into how the user becomes involved in the process of the construction of use. Interviewees described aspects of designing software and hardware a challenging and fun *"Its fun because we have fun with it."* A number of users are motivated by the finished product *" for us the important thing is the result"* The user take pride, seeing a certain amount of themselves embodied in the artifact. These experiences

can give rise to revisitable good moods and enduring, reworkable memories.

A number of users who were interviewed described the software they used as the ultimate tool: *"Its the ultimate tool - We discovered that the limit was unreachable."* The modular architecture of the software enabled them to design without boundaries and apply the tools to different aspects of software and hardware development. These digital objects have little in the way of obvious boundaries. They blend into the world of interactive usage, making it hard to assign fixed properties or qualities to them. *"Once you start talking to the people doing the things you start to see that its reachable. You realise that its just a bit of work and getting a few logic's and so you say OK lets do it, well lets try to do it"*

A key concern for those interviewed in relation to the software they used was how adaptable the software was with other applications. They were several interviewees that recounted stories of how they helped extend the functionality of their community by designing plugins and modules for extending the framework of software and hardware. *"I think they [the designers] are amazed about what users do with the software, which they never imagined someone could do that with this software. So it's interesting. Also in the community, there is so many kinds of usage that are possible with the software and so many people use it for different applications and all kind of areas."* These plugins and extensions embody strong narratives of use and encourage new forms of engagement and interaction within the community.

CONCLUSION

This paper presented some preliminary results from initial field studies with users of open source hardware and software. These accounts illustrate methods and approaches that these users take to continually shape systems to respond to their specific needs and settings by creatively appropriating artifacts and the surroundings. An open-ended system is in a continual open-ended state that can change and adapt to context over time. These are designs that embody strong narratives of use and encourage new forms of engagement. By observing the ways in which technology has been adopted, we can gain new perspectives for Interaction design where openness may form the basis for an approach to design that is essentially exploratory and has the potential to engage the user in richer, more meaningful experiences.

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