From Human Factors to Human Actors to Human Crafters: Principles Supporting Design in Use

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Abstract
Meta-design theory emphasizes that designers can never anticipate all future uses of their system, as users shape their environments in response to emerging needs; systems should therefore be designed to adapt to future conditions in the hands of end users. For most of human history, all design was meta-design; designers were also users. However, advances in technology introduced a divide between the skilled producers and unskilled consumers of technology, and between design time and use time. As our technological environments increase in complexity, meta-designers must provide the flexibility for users to create and shape their own tools. This paper describes the early phases of a research study identifying key principles for meta-designers and exploring their potential use as design heuristics.

Keywords
Design methods, meta-design, context, heuristics.

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

At one time, design and use were closely entwined activities: *human crafters* designed tools through use and there was no distinctly separate design process. As technology advanced, industrialization introduced a divide between the goals of the setting of design (*design time*) and the setting of use (*use time*). Design time focused on experts creating a completed design artifact, while use time was oriented towards gradual user-driven evolution and change, responsive to environment and context. This tension between what could be accomplished at design time and what unpredictable situations the system would encounter during use has been an ongoing challenge to the evolving field of HCI. As emphasized by this workshop topic, designers must increase their understanding of real-world experiences and future users in order to create systems better suited to unanticipatable conditions.

Background

When environments of use were constrained to the workplace, our early HCI methodologies could strive to match known work tasks with suitable interfaces; this *human factors* approach focused on the line between man and machine and the interfaces that afford interactions between the two. In the 1990s, when technology moved into the home and into more complex environments of use and practice, HCI methodologies began to take a broader view of interaction, supporting *human actors* who controlled the technologies used in their daily lives [2]. Our current HCI methodologies and theories are largely oriented towards this "human actors" relationship between technology, users, and use.

However, recently developed technologies have allowed for complex and shifting contexts of use [4] as well as empowered users to design their own technological environments. Novel means of information and technology production (e.g. open source software development, mash-ups, commons-based peer production [3]) have radically changed the technological landscape. Users are again behaving as *human crafters* – controlling, designing, and developing not only their relationships with technology, but the very form and function of this technology.

However, this behavior is poorly supported by our current design methodologies which distance designers, both in time and space, from future scenarios of use and future users. Our design processes, in the words of Stewart Brand, "over-respond to the immediate needs of the immediate users" [5]. And, as Suzanne Bødker notes, there are currently many challenges facing the field of HCI: (1) people need to be involved in design, not just as workers, but as someone who brings their entire life experience into the design, (2) this will necessitate a change in the way we design and prototype, and (3) we need to move away from end-user programming in isolation to configurations involving multiple people and multiple systems [4].

Fischer [6] suggests addressing these challenges by moving towards a future of user-centered development or *meta-design,* emphasizing *participatory co-design* throughout the life of the system. Meta-design describes a future state of design consisting of open systems that evolve during use, with design activities redistributed across time and levels of interaction with the environment. The framework emphasizes that the design of socio-technical systems must support flexible

and evolving systems, that are not (and cannot be) completely designed before use, and that evolve in the hands of their users.

However, these ideas need further exploration to provide generalizable design methods. My dissertation research, which is currently in progress, seeks to further these ideas and understand how we should design for a world that is increasingly full of human crafters. Specifically, I seek to derive useful heuristics from key literatures and perspectives supporting systems that evolve in the hands of their users over their entire lifespan, exploring them first in a controlled laboratory setting and then on real-world design problems.

Designing For an Unknown Future

The proposed idea generation process consists of a series of guidelines (see Table 1) to be used in a design time exercise aimed at focusing thought away from immediate needs and towards common emergent behaviors that users engage in over time. These center around: *connecting* – to people with similar interests or needs, *having conversations* – in real-time across space and time, *combining* – the system with other tools and systems they use, *getting up to speed quickly* – so undue time is not spent learning the system, and *tailoring* – such that the system is molded to their personal needs.

The series of principles that follow are aimed at orienting design time activities towards future use, as well as providing a frame for users and designers to communicate changes across the entire life of the system. These principles are derived from consolidating the broad literature on participatory co-design.

People like systems where they can:
1. **Connect** with other people with similar needs and interests, both nearby and far away.
2. **Reach out** and converse with other people in real-time, while they are using the system.
3. **Combine** it with other tools and systems they use regularly.
4. **Begin using it quickly**, without a lot of help or instruction.
5. **Tailor** it to their personalized needs.

Table 1: Principles for Designing in Use

The rationale behind the inclusion of each guideline is described below:

*Guideline 1: **Connect** with other people with similar needs and interests, both nearby and far away.*
John Thackara's [9] series of design frameworks for complex worlds emphasizes the increasing importance of systems that allow people to connect and communicate both locally and across the boundaries of time and space. This guideline intends to encourage these possibilities by focusing designers on how users can use the system to connect to similar people, and how they might attempt to extend the system.

*Guideline 2: **Reach out** and converse with other people in real-time, while they are using the system.*
Research prior to meta-design has explored modifiable systems that allow for reflective use-time conversations

to occur, between designers and users [eg. 7]. This guideline seeks to emphasize how users can have live experiences and conversation with other people within, or around, the system.

Guideline 3: ***Combine*** *it with other tools and systems they use regularly.*
The new (or redesigned) system may be only one of several tools and systems they use on a daily basis or even at the same time. While designers can never anticipate exactly how their system might be used, a focus on the surrounding edge and combinatory effects may spark new ideas [9].

Guideline 4: ***Begin using it quickly****, without a lot of help or instruction.*
Alexander's unselfconscious culture of design [1] requires systems users can understand relatively quickly and then contribute to confidently. This guideline is oriented towards envisioning ways in which novice users could begin using systems quickly and confidently, becoming empowered to act as designers.

Guideline 5: ***Tailor it*** *to their personalized needs.*
Henderson and Kyng's [8] early writings on designing in use identified tailorability as essential to systems supporting users acting as designers. The system may tailor itself to the particular individual's needs automatically or through the user's tailoring actions. It is the intent of this guideline to bring these needs to the forefront of design discussions and decisions.

What I Will Contribute and What I Hope to Learn

In the past few months, enough pilot experiments have been conducted to know that the guidelines listed above are understood by experimental participants and that participants report using the guidelines when designing. This winter, a larger experiment is being run to validate the value of these guidelines. Sharing the results of these experiments should be of interest to workshop participants. Also, I am seeking wider input on these guidelines, particularly about how they might help designers to envision future contexts of use and support users acting as designers.

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