Design Research

Jordan Beck | November 28, 2018 version 1

Framing

“In the HCI and IxD research communities there has been a struggle to figure out how to integrate design with technology and behavioral science in support of HCI education and research” (Zimmerman, Forlizzi, Evenson, 2007).

Structure...

key terms/definitions

examples of design research

role of design in HCI research

evaluation criteria

current questions/issues

resources

What are some key definitions?

Design. A process in which something is created -- working out the form of something new, consciously [intentionally] creating something that was not there before... (Nelson + Stolterman, 2003)

Design Research.

An inquiry focused on producing a contribution of knowledge rather than on the development of a product

(Zimmerman, Forlizzi, Evenson, 2007).

RtD involves **designing something** (e.g. an artifact or system) as key component of your inquiry.

“Research is the point and design is the means to do it” (Fallman, 2008)

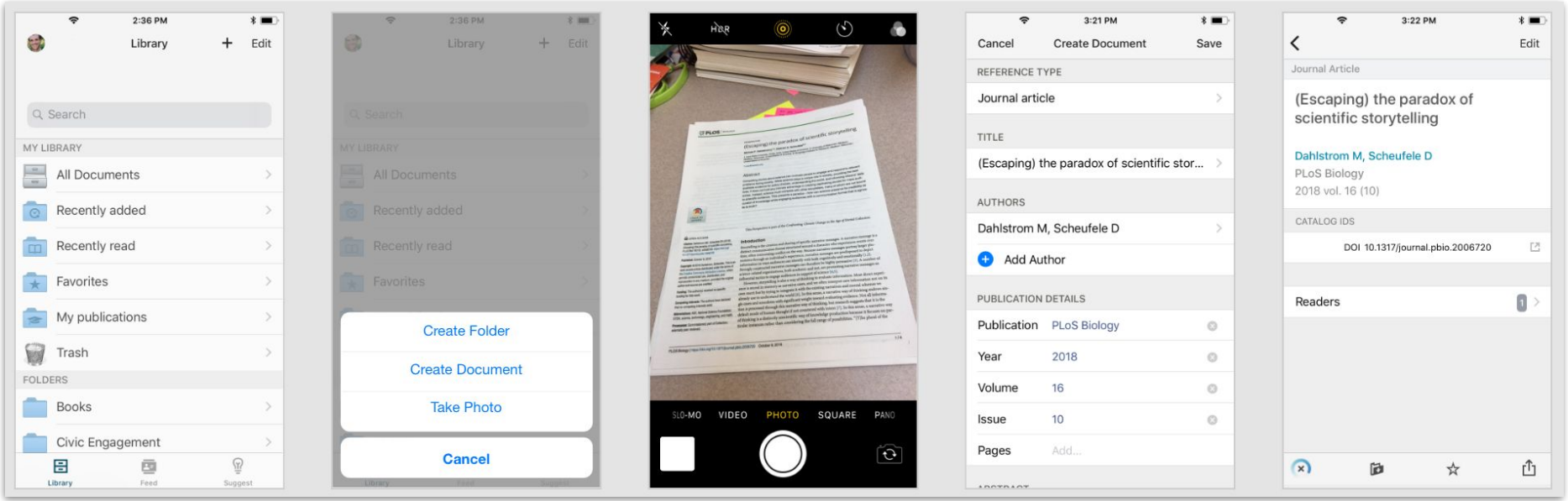
What are some examples of RtD?

(early stage)

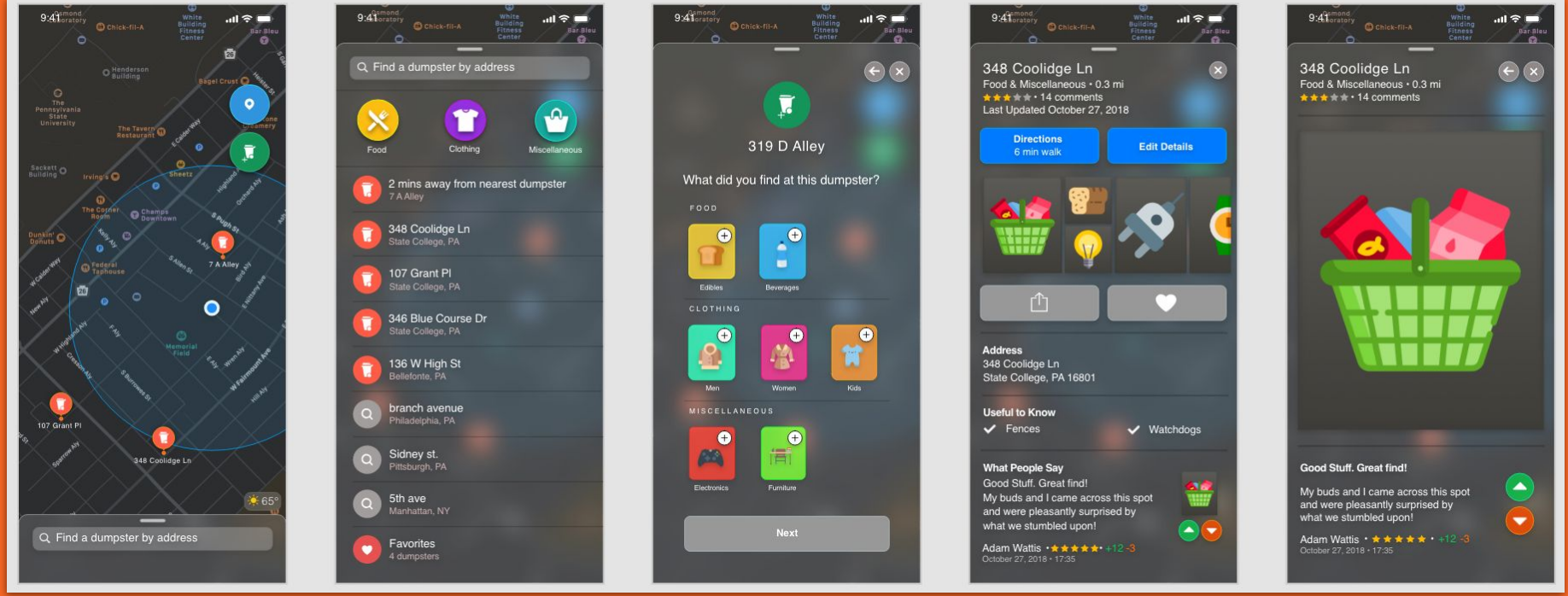
- ➔ **Mendeley Mobile** (Beck...)
- ➔ **Dive** (Beck, Chakravarty, Wattis)
- ➔ **Philosophers Living with the Tilting Bowl** (Wakkary et al. 2018)
- ➔ **TaskCam** (Boucher et al, 2018)

(late stage)

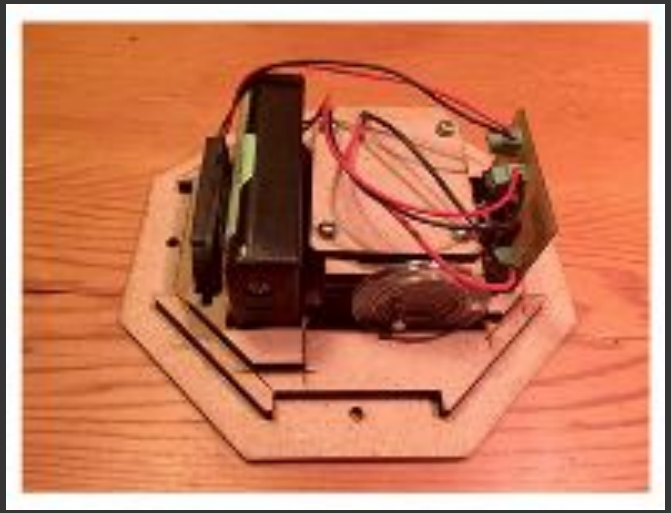
Mendeley Mobile (Beck, 2018)



Dive (Beck, Chakravarty, & Wattis, 2018)



Tilting Bowl (Wakkary et al., 2018)



TaskCam (Boucher et al., 2018)

A design is something real that helps researchers determine something true.

Design should be integrated into a research project as soon as possible.

What do designers add to research projects?

One. Attention to problem setting.

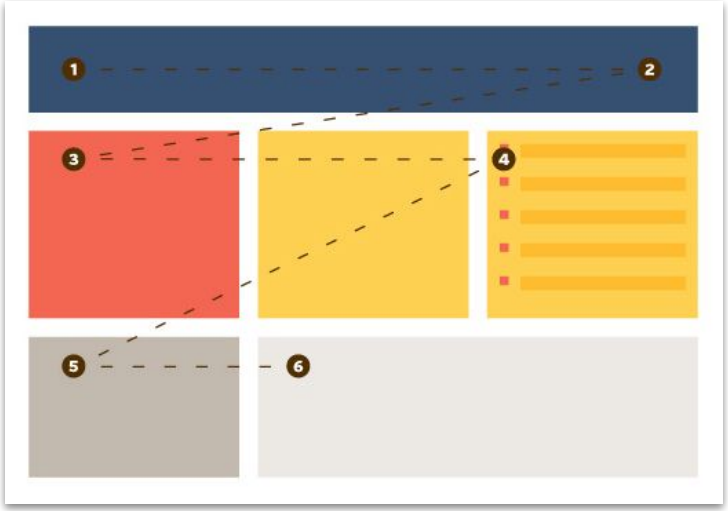
Theory-Practice Gap (Beck & Ekbia, 2018)

Problems are artificial.

Two. Pattern languages.

Pattern Languages

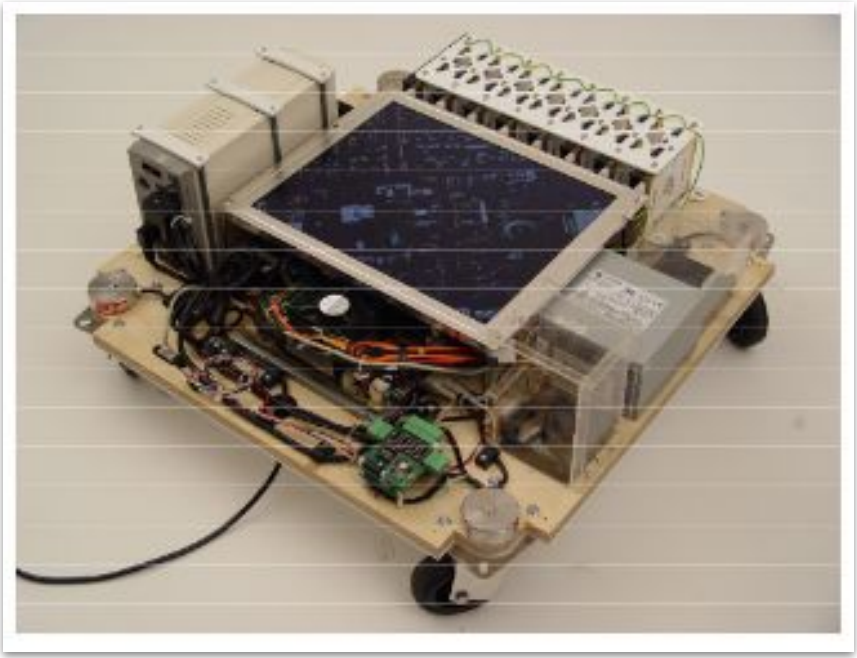
Give regular, intelligible form to design principles, guidelines, qualities, ...



Three.

Attention to critical issues.

Example 1: Drift Table



William W. Gaver, John Bowers, Andrew Boucher, Hans Gellerson, Sarah Pennington, Albrecht Schmidt, Anthony Steed, Nicholas Villars, and Brendan Walker. 2004. The drift table: designing for ludic engagement. In *CHI '04 Extended Abstracts on Human Factors in Computing Systems* (CHI EA '04). ACM, New York, NY, USA, 885-900. DOI: https://doi.org/10.1145/985921.985947

Designs articulate/embody critical questions.

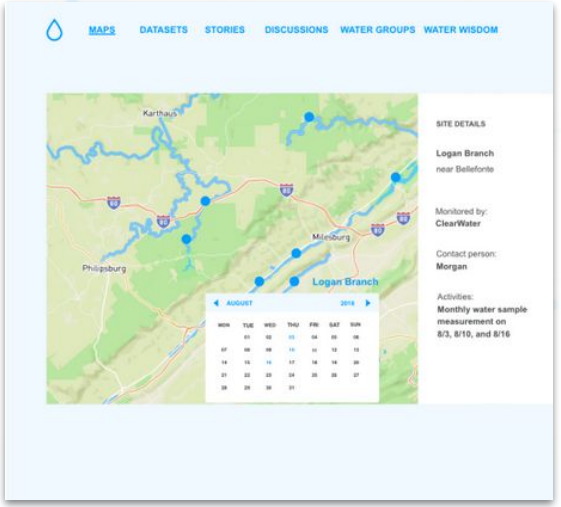
Image: https://www.moma.org/interactives/exhibitions/2013/designandviolence/menstruation-machine-sputniko/

"*Menstruation Machine*" by Sputniko!

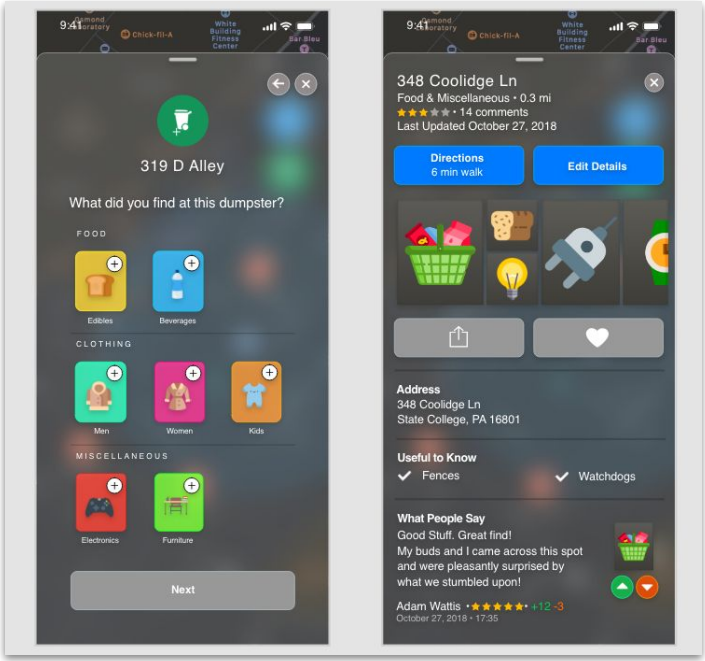
Designs facilitate data collection

Direct Collection. The design captures and stores data.

Indirect Collection. The design supports interviews, ..., ...



Designs help communicate contributions.



Designs envision futures, and, thus, raise questions and identify possible research directions.

Design Fiction

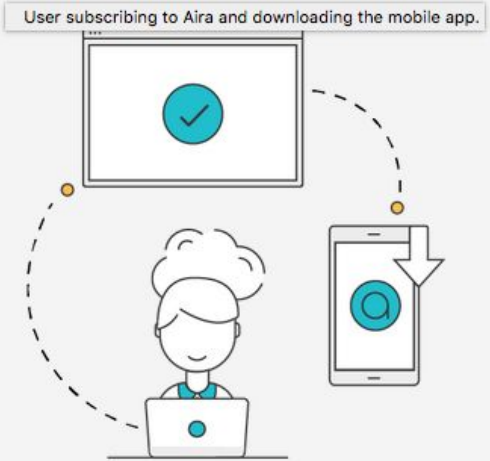
"[stories or scenarios in which] the imaginary technologies are plausible and the social and political context for the new technologies is imagined in depth and detail..." (Sterling via Blythe, 2017).

"Design fiction creates imaginative conversations about possible future worlds... it speculates about a near future tomorrow, by extrapolating from today" (Bleeker, 2009)

Even artifacts tell [ambiguous] stories (Blythe, 2017)

Computer Vision Scenario (developed in the center for HCI @ Penn State University)

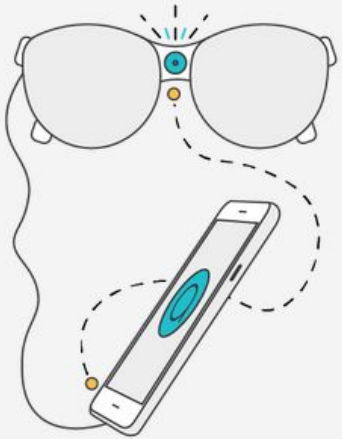
Kelly receives a notification from her phone to take a new medicine she was recently prescribed. As she goes to get the medicine bottle, she worries about selecting the right bottle and making sure she has the right time and dosage - she takes quite a few medicines now and is not yet confident about this new one. She calls Aira and asks the agent, Tom to read her the information on the label. So that Tom can get a clear view of the information she needs, Kelly must position her phone in just the right orientation and distance. Even so, Tom can only see a partial address for the pharmacy and no information at all about time of day or dosage. The text is also tilted, because Kelly cannot tell how to align it with the medicine bottle. Instead, ***Tom uses the computer vision application to correct the text alignment zooms out so that he can see more of the label to read the relevant information. The application automatically zooms in when it detects specialized text (e.g., "mg") so that Tom can see the details easily****.*



STEP ONE

Subscribe and Download

Pick the plan that makes the most sense for you, sign up in a couple of minutes and download the Aira app to your smartphone. Simple.



STEP TWO

Connect with a certified Aira agent

On the first call, connect with our specially trained Agents and learn how everything works.

STEP THREE

Receive real-time assistance

At the touch of a button, Aira delivers instant access to information, enhancing everyday efficiency, engagement, and independence.

image + copy: https://aira.io/

The Team:

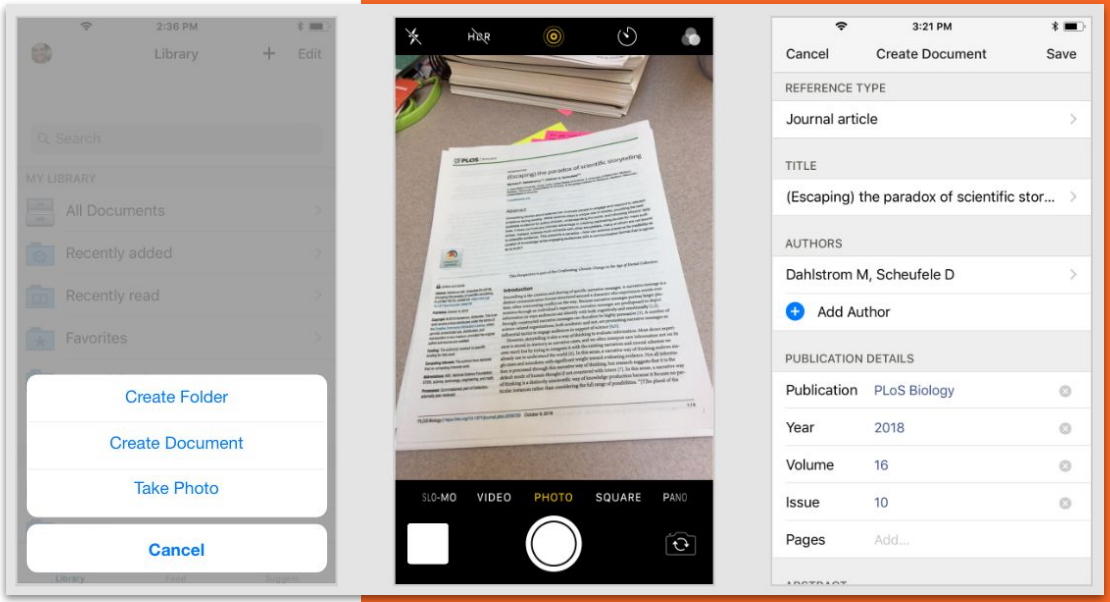
Julian Bleecker
Nick Foster
Fabien Girardin
Nicolas Nova

Image: http://nearfuturelaboratory.com/index.html

TBD Catalogue

Even artifacts tell [ambiguous] stories (Blythe, 2017)

Mendeley mobile imagines a possible near future where researchers add texts to their digital libraries simply by taking photos.



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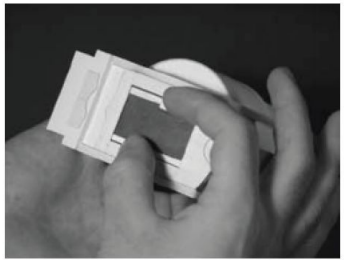

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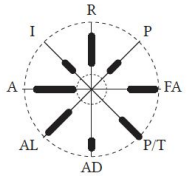

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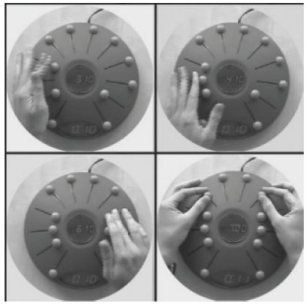
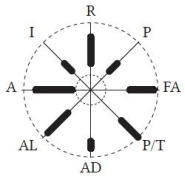


The alarm clock carries a trace of the expression of the action. The modulated appearance of the slider alarm is evidence for the fact that it has been acted upon. It is a trace of a bygone action.



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Iconographic References imagine a possible future where *images* are accounted for as intellectual influences in scholarly communication.

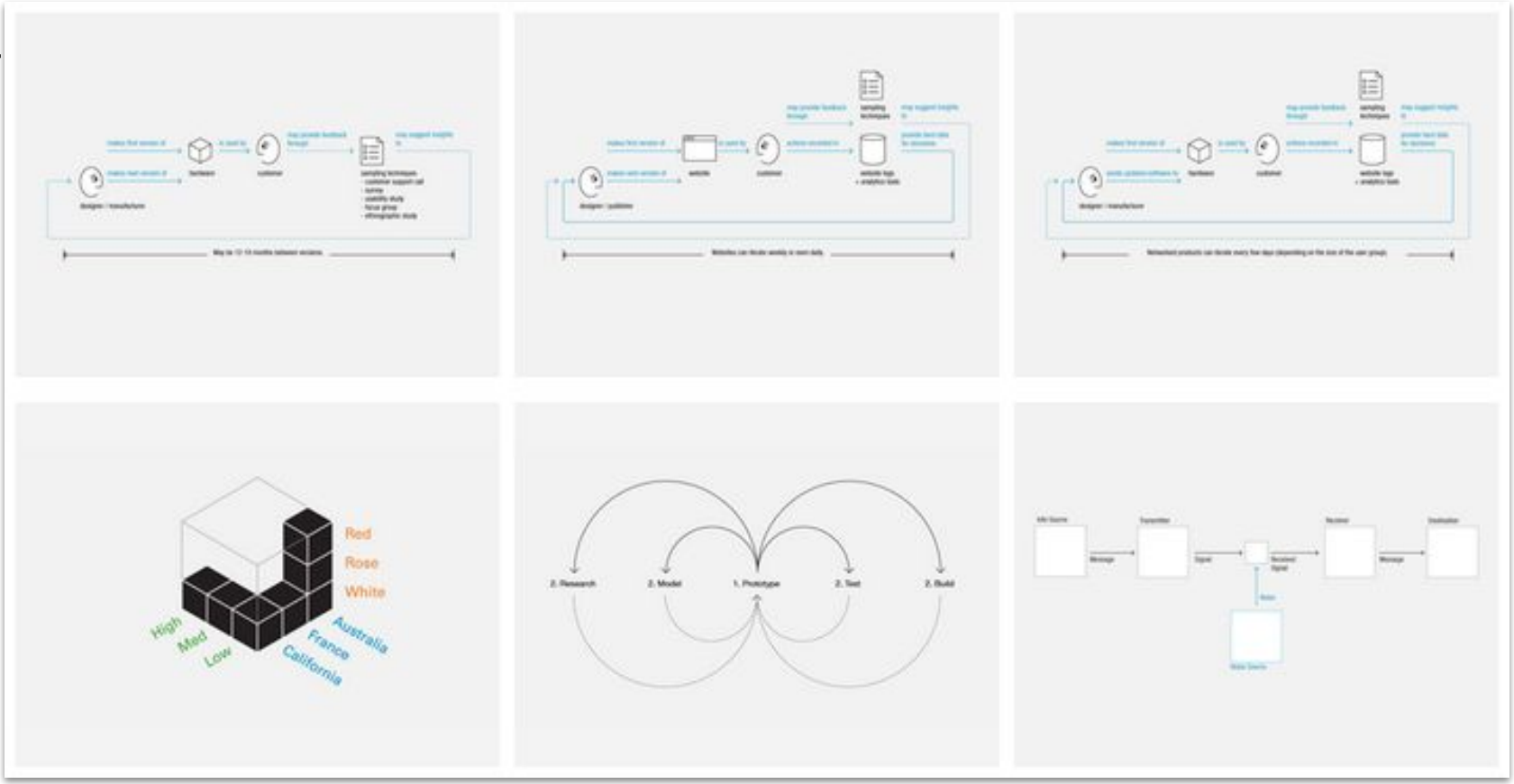
The nature of a design in RtD is contingent.

How should we evaluate RtD?

Four Evaluative Criteria

(Zimmerman, Forlizzi, Evenson, 2007)

(1) Process Documentation
(2) Relevance of the design (and its implied possible future)
(3) Invention (novelty)
(4) Extensibility



Process

http://www.dubberly.com/models

Invention

Production of a novel integration of various subject matters to address a specific situation.

Key question: is it a novel application of existing knowledge?

Relevance. Is the design relevant to a problem within a particular community? Is the preferred future it expresses appropriate?

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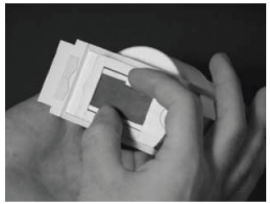

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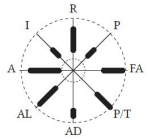

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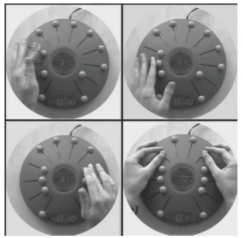

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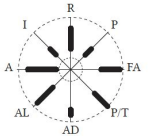

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Extensibility. The ability to build on the outcomes of the research; employing the process or using the knowledge.

Equator Workbook 1

The second two workbooks were produced in the course of is within the Equator Interdisciplinary Research Collaboration, which brought together seven UK university groups to explore how computational technologies can blur the boundaries between electronic and physical worlds in everyday life (www.equator.ac.uk/). Within Equator, our group focused on home technologies.

With such an open-ended brief, an integral part of developing specific designs was to decide for ourselves and related treatments printed in A4 landscape format.

The individual team members each had their own techniques and approaches for expressing design ideas, so proposals varied in their visual appearance and use of text (see Figure 3). An overall shared style did emerge, however. The images used a variety of resources: found imagery, diagrams, and computer-generated images that themselves ranged from the clearly hand-constructed (e.g. Sailor's Return on the bottom right of Figure 3) to the more impersonal (e.g. Product Wars in the bottom centre). Nonetheless, the overall graphical style of this workbook is

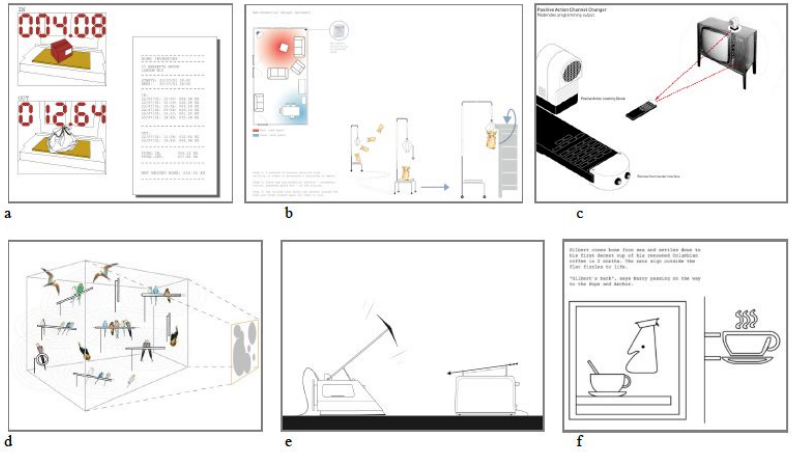


Figure 3. Proposals from Equator Workbook 1.

William Gaver. 2011. Making spaces: how design workbooks work. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '11). ACM, New York, NY, USA, 1551-1560. DOI: https://doi.org/10.1145/1978942.1979169

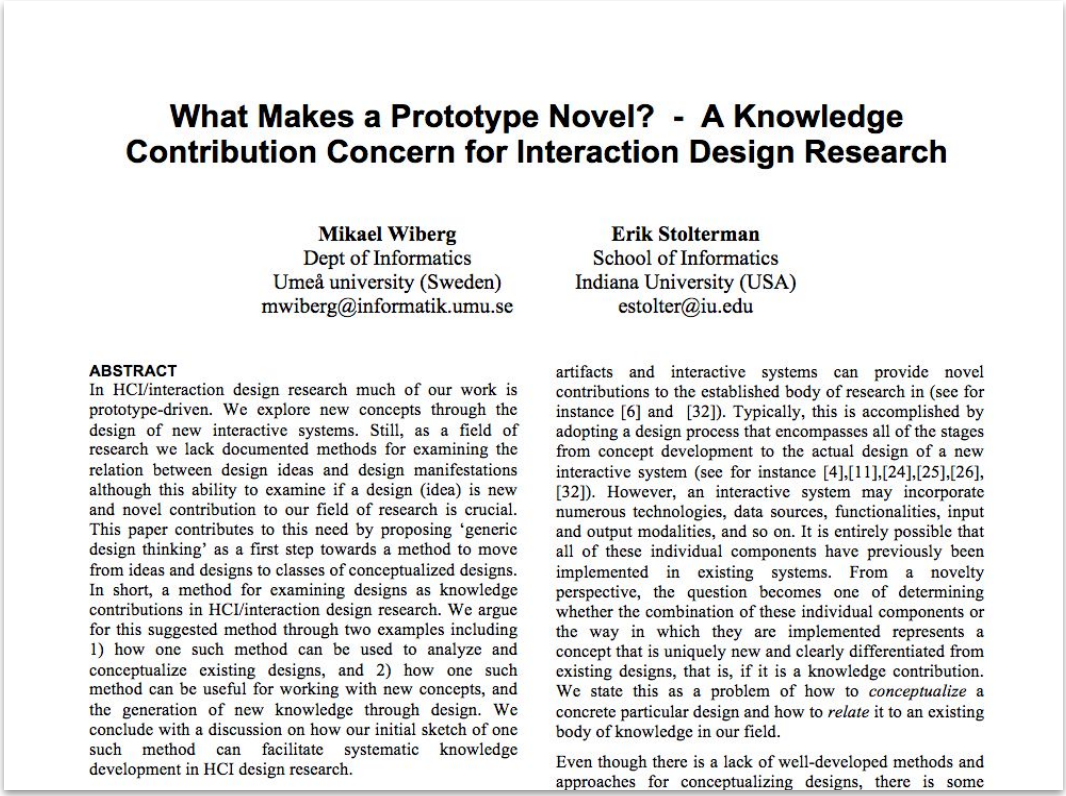
Process

Invention

Relevance

Extensibility

Some current topics and questions.



What Makes a Prototype Novel? - A Knowledge Contribution Concern for Interaction Design Research

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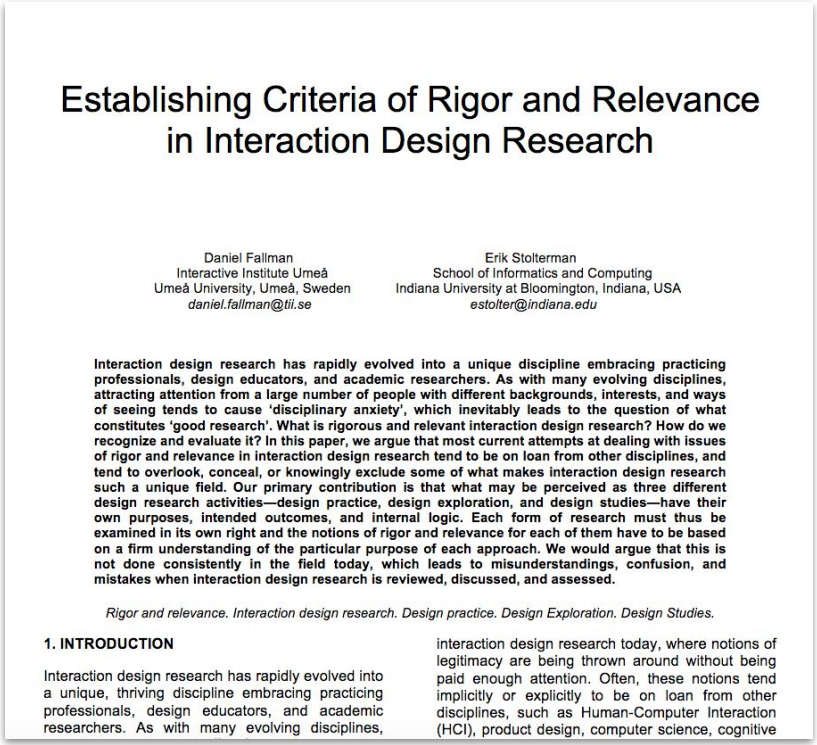
ABSTRACT
In HCI/interaction design research much of our work is prototype-driven. We explore new concepts through the design of new interactive systems. Still, as a field of research we lack documented methods for examining the relation between design ideas and design manifestations although this ability to examine if a design (idea) is new and novel contribution to our field of research is crucial. This paper contributes to this need by proposing 'generic design thinking' as a first step towards a method to move from ideas and designs to classes of conceptualized designs. In short, a method for examining designs as knowledge contributions in HCI/interaction design research. We argue for this suggested method through two examples including 1) how one such method can be used to analyze and conceptualize existing designs, and 2) how one such method can be useful for working with new concepts, and the generation of new knowledge through design. We conclude with a discussion on how our initial sketch of one such method can facilitate systematic knowledge development in HCI design research.

artifacts and interactive systems can provide novel contributions to the established body of research in (see for instance [6] and [32]). Typically, this is accomplished by adopting a design process that encompasses all of the stages from concept development to the actual design of a new interactive system (see for instance [4],[11],[24],[25],[26], [32]). However, an interactive system may incorporate numerous technologies, data sources, functionalities, input and output modalities, and so on. It is entirely possible that all of these individual components have previously been implemented in existing systems. From a novelty perspective, the question becomes one of determining whether the combination of these individual components or the way in which they are implemented represents a concept that is uniquely new and clearly differentiated from existing designs, that is, if it is a knowledge contribution. We state this as a problem of how to *conceptualize* a concrete particular design and how to *relate* it to an existing body of knowledge in our field.

Even though there is a lack of well-developed methods and approaches for conceptualizing designs, there is some

Artifacts as knowledge contributions

What makes a design process rigorous?



Establishing Criteria of Rigor and Relevance in Interaction Design Research

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Interaction design research has rapidly evolved into a unique discipline embracing practicing professionals, design educators, and academic researchers. As with many evolving disciplines, attracting attention from a large number of people with different backgrounds, interests, and ways of seeing tends to cause 'disciplinary anxiety', which inevitably leads to the question of what constitutes 'good research'. What is rigorous and relevant interaction design research? How do we recognize and evaluate it? In this paper, we argue that most current attempts at dealing with issues of rigor and relevance in interaction design research tend to be on loan from other disciplines, and tend to overlook, conceal, or knowingly exclude some of what makes interaction design research such a unique field. Our primary contribution is that what may be perceived as three different design research activities—design practice, design exploration, and design studies—have their own purposes, intended outcomes, and internal logic. Each form of research must thus be examined in its own right and the notions of rigor and relevance for each of them have to be based on a firm understanding of the particular purpose of each approach. We would argue that this is not done consistently in the field today, which leads to misunderstandings, confusion, and mistakes when interaction design research is reviewed, discussed, and assessed.

Rigor and relevance. Interaction design research. Design practice. Design Exploration. Design Studies.

1. INTRODUCTION

Interaction design research has rapidly evolved into a unique, thriving discipline embracing practicing professionals, design educators, and academic researchers. As with many evolving disciplines, interaction design research today, where notions of legitimacy are being thrown around without being paid enough attention. Often, these notions tend implicitly or explicitly to be on loan from other disciplines, such as Human-Computer Interaction (HCI), product design, computer science, cognitive

Can design, in itself, be a legitimate approach to research?

Resources for further inquiry.

Design Research Journals

Design Studies

Design Issues

Research in Engineering Design

Design Science

International Journal of Design

Artifact

Conferences + Orgs

Design Research Society (DRS) Conference

Designing Interactive Systems (DIS)

Intn'l Association of Societies of Design Research (IASDR)

Research through Design (RtD)

Design Theory SIG

Design as Research in the Americas (DARIA)

Listservs

Phd-design

https://www.jiscmail.ac.uk/cgi-bin/webadmin?A0=PHD-DESIGN

Texts

https://www.mendeley.com/community/design-research-21/

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