

QUESTION 01

Weiser, M. (1991). Scientific America. The Computer for the 21st Century.(Sept. 1991), 94-104.

Describe the major contributions of this paper?

Ubiquitous computing

Tab, pads, boards

Active badge (?)

Context Awareness (partially)

How does this paper argue for or against better screen based graphical user interfaces?

For

- *Need to think differently about reachability (boards)*
- *Interfaces that accommodate pens*
- *Visibility of screens and surfaces at different scales and distances*
- *Layout*
- *Address fat finger problems*

Against

- *At 100x computers per room, we can't focus on them all having screens. How else will we interact with them?*
- *Desktop metaphors failed since Windows interface is small compared to real world of paper and desks*

Using this paper as a framing, discuss the role of Virtual Reality?

From the paper:

Perhaps most diametrically opposed to our vision is the notion of virtual reality, which attempts to make a world inside the computer. Users don special goggles that project an artificial scene onto their eyes; they wear gloves or even bodysuits that sense their

*motions and gestures so that they can move about and manipulate virtual objects. Although it may have its purpose in allowing people to explore realms otherwise inaccessible – the insides of cells, the surfaces of distant planets, the information web of data bases – virtual reality is only a map, not a territory. It excludes desks, offices, other people not wearing goggles and bodysuits, weather, trees, walks, chance encounters and, in general, the infinite richness of the universe. **Virtual reality focuses an enormous apparatus on simulating the world rather than on invisibly enhancing the world that already exists.***

*Indeed, the opposition between the notion of virtual reality and ubiquitous, invisible computing is so strong that some of us use the term "**embodied virtuality**" to refer to the process of drawing computers out of their electronic shells. The "virtuality" of computer-readable data – all the different ways in which they can be altered, processed and analyzed – is brought into the physical world.*

What is the computer for the 21st century? Has it arrived? How or how not?

Note: THIS QUESTION WAS NOT ASKED TO STUDENTS

Has **not** arrived:

- *Pads should not be carried around according to Weiser*
- *Scrap computing – disposal low cost computing*
- *Ubiquitous computing may mean the decline of the computer addict*

Weiser pointed out some serious concerns that will need to be addressed prior to ubiquitous computing adoption. Can you articulate and discuss those concerns?

From the paper:

Moving applications/windows across interfaces: *Although the X Window System and Windows 3.0, for example, can cope with multiple screens, they do not do well with applications that start out on one screen and move to another, much less those that peregrinate from computer to computer or room to room.*

Handling dynamic changing hardware at run time (Micro-kernels): *Pads, tabs and even boards may come and go at any time in any room, and it will certainly be impossible to shut down all the computers in a room to install new software in any one of them. (Indeed, it may be impossible to find all the computers in a room.)*

Security and privacy...*particularly in the hands of governments and companies...knowing who was around and where people were and what they were doing...*

“Even today the active badges and selfwriting appointment diaries that offer all kinds of convenience could be a source of real harm in the wrong hands.”

Social issues that embodied virtuality will engender. Perhaps key among them is privacy: hundreds of computers in every room, all capable of sensing people near them and linked by high-speed networks, have the potential to make totalitarianism up to now seem like sheerest anarchy.

QUESTION 02

John Zimmerman, Jodi Forlizzi, and Shelley Evenson. 2007. Research through design as a method for interaction design research in HCI. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '07). ACM, New York, NY, USA, 493-502. DOI: <https://doi.org/10.1145/1240624.1240704>

What is the premise of the 2007 paper and term “Research Through Design” by John Zimmerman, Jodi Forlizzi and Shelly Evenson?

The role of design, particularly design research has typically played a subservient (secondary) role within HCI. This paper articulates the role of design research away from only the aesthetic and also how design itself can be a lead contributor to HCI research. It outlines a method for how to evaluate design research. Particularly, there are four lenses for evaluating the research contribution and a set of three examples of the benefits of this type of research.

This paper was pushing back on the idea that “The designers work in service of research, with the goal of creating a research prototype that more clearly communicates the research contribution.”

This paper makes two contributions:

- *a model of interaction design research designed to benefit the HCI research and practice communities*
- *a set of criteria for evaluating the quality of an interaction design research contribution.*

The paper title contains the terms “Research Through Design” and “Design Research”. What are the authors calling out by invoking these terms? For example how is Design Research different than other types of design practice such as industrial design or graphic design?

In the early days, the term “design” within the HCI community meant usability engineering

The emergence of design research as a separate activity from design practice grew out of the need to formally address the increasing complexity of systems designers were being asked to create.

*Design researchers focusing on the **development of knowledge instead of artifacts for consumption.***

*The term **design research implies an inquiry focused on producing a contribution of knowledge.** This paper follows the convention of the design researchers, and we intend the term design research to mean an intention to **produce knowledge and not the work to more immediately inform the development of a commercial product.***

What is unique to this approach to interaction design research is that it stresses design artifacts as outcomes that can transform the world from its current state to a preferred state.

In engineering design, developers created software to meet a specification, and in creative design, designers continually reframed the problem, constantly questioning the underlying assumptions during the design process.

***Design researchers also undertake problem framing** that helps identify important gaps in behavioral theory and models. In evaluating the performance and effect of the artifact situated in the world, design researchers can both discover unanticipated effects and provide a template for bridging the general aspects of the theory to a specific problem space, context of use, and set of target users.*

It follows from Christopher Frayling's concept of conducting research through design where design researchers focus on making the right thing; artifacts intended to transform the world from the current state to a preferred state.

Also (outside paper): Research Through Design (RTD) is a concept that describes a research approach where the design process in itself becomes a way to acquire new knowledge. The term was coined by Christoffer Frayling in 1993 as a proposal to differentiate between different types of design research, the other ones being research into and for design. Frayling describes RTD as "Taking design as a particular way of thinking, and a particular approach to knowledge, which helps you to understand certain things that are outside design."

*Also (aside outside of paper framing): For a long time, design and research have been regarded as separate endeavors – the former residing in industrial practice and craft, the latter in academic experiments and reflection. In the past decades, as areas such as interaction design and other forms of design were growing their academic basis, became more widespread as subjects taught at universities, and grew a research culture, two things happened. First, **doing research became a recognized part of designing products (and later services).** Second, **design activities, along with designed artifacts, would become established as the chief elements in the process of generating and communicating knowledge.** Ever since Frayling's influential speech (1993, 2015), these two have become referred to as **research for design** and **research through design (RtD)**, respectively.*

The paper argues around a distinction between Design Practitioner and Design Researcher. When engaged in Design Research the approach should ignore or deemphasize particular details. Can you describe some of those details? Why should they be ignored?

*First, the intent going into the research is to produce knowledge for the research and practice communities, not to make a commercially viable product. To this end, we expect research projects that take this research through design approach will ignore or deemphasize perspectives in framing the problem, such as the **detailed economics associated with manufacturability and distribution**, the **integration of the product into a product line**, the **effect of the product on a company's identity**, etc. In this way design **researchers focus on making the right things**, while **design practitioners focus on making commercially successful things**.*

Second, research contributions should be artifacts that demonstrate significant invention. The contributions should be novel integrations of theory, technology, user need, and context; not just refinements of products that already exist in the research literature or commercial markets.

In the paper, the authors discuss how design research is better suited to addressing particular types of problems. Can you describe these types of problems and how they lend themselves towards such design research approaches?

*Under-constrained problems
Wicked Problems*

Horst Rittel and Melvin Webber proposed the concept of a "Wicked Problem," a problem that because of the conflicting perspectives of the stakeholders cannot be accurately modeled and cannot be addressed using the reductionist approaches of science and engineering. They argued that many problems can never be accurately modeled, thus an engineering approach to addressing them would fail. This work pointed to an opportunity for design research to provide complementary knowledge to the contributions made by scientists and engineers through methods unique to design and design processes.

Can you give us an example of a wicked problem?

(many examples possible)

In the paper they describe three roles for design to play in research. Can you describe these three roles?

Note: THIS QUESTION WAS NOT ASKED TO STUDENTS

Three roles for design to play in research emerged:

1. design researcher **in service of a research community**—working to help researchers ground and frame problems and communicate the impact;
2. design researcher **as critic** of the HCI community—making artifacts that stimulate discussion of critical issues;
3. design researcher **as pattern finder**, finding patterns that lead to pattern languages.

The paper discussed work by Christopher Alexander. Can you describe this work?

Christopher Alexander's work on **Pattern Languages** represents an example of how research performed by design researchers on design methods has had an impact on the HCI community. His work asks design researchers to examine the context, system of forces, and solutions used to address repeated design problems in order to extract a set underlying "**design patterns**", thereby producing a "**pattern language**"

How does this work on Pattern Languages relate to design?

Patterns of use for interfaces, websites, etc. Humans fundamental work well within patterns of usage. Memory, recall, legibility, understandability, discovery, etc.

The paper describes design practice as focused on making a commercially successful product. However, they describe a different role for design researchers engaged in critical design. Can you discuss the particular role of critical design as opposed to other types of design practice?

*Unlike design practice, where the making focuses on making a commercially successful product, **design researchers engaged in critical design create artifacts intended to be carefully crafted questions**. These artifacts stimulate discourse around a topic by challenging the status quo and by placing the design researcher in the role of a critic.*

Can you give an example of critical design?

(many examples possible)