

Theme issue on Histories of Ubicomp

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1 Introduction

As ubiquitous computing has grown as a field, so too have the narratives around both ubicomp's origins and how those origins impact its futures. In this special issue of *Personal & Ubiquitous Computing*, we seek to articulate those multiple voices and histories reflecting these multiple origins, each of which has a story to tell about the history of ubiquitous computing. These histories reside in multiple fields, from computer science and informatics, to history of science and STS, to design and urban planning—to name a few—as well as ubicomp's new instantiations, such as the Internet of Things (IoT), smart cities, the architecture of the cloud and mobile computing.

The questions of the origins and influences of ubicomp garner more than passing academic interest. Since Mark Weiser's 1991 article, and in the context of a growing role for research informed by a wide variety of user-focused approaches, the idea of ubicomp has grown from experiments in the laboratory, to a field of research for computer scientists and informatics scholars, to inspiration for a new breed of designers and technologists. Today, it is the burgeoning mainstream in an increasingly connected world. This journal, *Personal & Ubiquitous Computing* was founded in 1997, and the Ubicomp conference, ubicomp.org, has flourished and grown since its founding in 2001. In the last few years, the term *internet of things* (IoT) has become more widespread, reflecting a renewed interest in ubicomp outside of the academy and research, and

simultaneously, the voices, epistemologies and academic traditions involved with ubicomp have become more varied.

We hope this special issue will motivate new and better ways to “do computing”—to enable different kinds of discussions and collaborations to advance discussion around ubiquitous computing. While many readers of *PUC* have been steeped in ubicomp for years, if not a decade or two, the concept of ubiquitous computing is still quite new to many of the fields and disciplines it touches. We aim to connect disparate fields, not only ubicomp, HCI and computer science, but also verging into communications, architecture, science and technology studies, and design. Certainly, part of that interest comes from our own backgrounds: Jofish Kaye has a Ph.D. in Information Science with an emphasis in Science & Technology Studies and is currently Principal Research Scientist at Mozilla, a non-profit focused on improving the open internet; and Molly Wright Steenson holds a Ph.D. in Architecture, writes about the history of AI in architecture and design and is a design professor at Carnegie Mellon University. We both are keenly interested in bridging disciplines, in finding new approaches for researching and sharing histories and narratives. We also wanted to explore what happens when we develop a history that doesn't try to do the (in Donna Haraway's words) “god trick of seeing everything from nowhere,” but instead that seeks to play with partial and situated pictures, knowledge, configurations and practices.

In this special issue, we want to address some core questions. What went into the creation of ubicomp? How was ubicomp configured and refigured? Marc Weiser, of course, plays a central role in ubicomp's creation myth. But what else was—and from today's perspective, is—present? What kinds of human and disciplinary configurations and collaborations made ubicomp possible? In considering the

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multiple presences of ubicomp, what then is *absent* from ubicomp narratives? And how might some of these presences and absences be brought to light in this special issue?

Just as ubicomp is a hybrid discipline, so too are the approaches of the authors in this special issue. None of papers in this special issue try to be traditional histories, and none of the authors claim to be traditional historians. In their narratives of process and progress, the authors in this special issue may make different epistemological assumptions than a historian might—but this provides opportunities to create different kinds of knowledge than a historian is able to create. We found this hybrid, situational approach to be an appropriate method for ubicomp, a discipline that came from the intersection of computer science, the social sciences, HCI, design, architecture and beyond.

2 The papers

2.1 The motivations of ubiquitous computing

Leila Takayama's paper, "The Motivations of Ubiquitous Computing: Revisiting the Ideas Behind and Beyond the Prototypes", takes as its starting point a paragraph of Weiser's Scientific American article:

Such a disappearance is a fundamental consequence not of technology, but of human psychology. Whenever people learn something sufficiently well, they cease to be aware of it. When you look at a street sign, for example, you absorb its information without consciously performing the act of reading. Computer scientist, economist, and Nobelist Herb Simon calls this phenomenon "compiling"; philosopher Michael Polanyi calls it the "tacit dimension"; psychologist TK Gibson calls it "visual invariants"; philosophers Georg Gadamer and Martin Heidegger call it "the horizon" and the "ready-to-hand", John Seely Brown at PARC calls it the "periphery". All say, in essence, that only when things disappear in this way are we freed to use them without thinking and so to focus beyond them on new goals.

Takayama investigates this set of references along with archival research and a series of interviews with key influencers in the history of ubicomp and uses these to both map aspects of Weiser's path to creating his vision of ubiquitous computing and to leverage a critique of current work in the field. For example, current work on Internet of Things (IoT), emphasizes the Things themselves: devices, control, networked objects. Takayama uses these foundational players and works of ubicomp to motivate a different set of focuses: leveraging unconscious human processing,

an increased emphasis on embodiment, supporting human interpersonal relationships.

2.2 Undisciplined disciples

Alan Blackwell, Mark Blythe and Jofish Kaye set out to explore the influence of ethnomethodology on HCI, but without claiming to develop an authoritarian history. The authors developed ubicomp narratives that use bricolage and pastiche (borrowing and reworking source material from other texts) in the interest of working both inside and outside of ethnomethodology to shed light on its mechanisms.

Although not wishing to emphasise the fact, this paper has developed from structured interviews, archival research, historical analysis and application of the methods of grounded theory including open coding, preparation of memos, axial coding, diagramming, constant comparison and so on. But however helpful these methods have been in developing our ideas, we do not wish to claim them as a source of authority. The bricolage that we have engaged in is a reflection and interpretation of ethnomethodology within HCI, not a critique.

The end result of Blackwell, Blythe and Kaye's study is a piece of design research involving over twenty-five interviews that weaves freewheeling, playful stylings that refer to the work of Carlos Castaneda and Douglas Coupland's *Microserfs*. It uses an analogy drawn from two forms of the Anglican Church to explore tensions in the field, such as the epistemological clashes between corporate and scientific actors and the critique inherent in the social sciences that were being incorporated into research practices, and concludes with implications for current practices incorporating social sciences and technological research.

2.3 Figuring ubicomp (out)

Xaroula (Charalampia) Kerasidou explores ubicomp's configuration through three figures: the name and term "ubiquitous computing," the father figure of Mark Weiser, and the different temporalities that make up the vision of ubicomp. By dissecting the figures in this way, she unpacks the tensions and contradictions underlying each figure. In so doing, she destabilizes the presentation of ubicomp as a unified practice. Kerasidou writes:

Ubiquitous computing is multiple and messy, and done differently in different sites and different stories... this multiplicity and messiness is worked in such ways as to get folded into and hidden away. The stories of the multiple and, sometimes contradictory, ubiquitous

computings, in the plural, get sterilised, reduced and almost solidified around the one dominant story and history of the founding father and the ordered past and future. This process then results in a configuration sturdy enough so as to be easily and readily reproducible, and one that can become the basis for other stories, hence furthering its dominance. Employing the methodological tool of configuration, this paper seeks to intervene to this process by bringing some of this messiness and multiplicity to the fore.

Kerasidou enables a questioning of the “(hi)stories” that make up ubicomp, and suggesting new and different potential configurations and understandings of its legacies.

2.4 Ubiquitous technologies for older people

Michela Cozza, Antonella De Angeli and Linda Tonolli explore the implications of taking seriously older users in their paper “Ubiquitous technologies for older people” by exploring three dimensions of use: paradigms, users and contexts. They ground their work in a review of nearly two decades of papers published in PUC addressing older users and divide the work into two key paradigms: functional studies, aimed at building technologies to better manage the lives of older people, and sociotechnical studies, focused on the entanglement of social and technical categories. They divide the framing of the user into two categories: stereotypes, in which work is based off assumptions about the nature of older users without specific study, and user involvement, in which the old users in questions are involved as stakeholders, either in an informative role (where they primarily provide information), as a consultative role (in which they comment on predefined solutions) or as a participative role (in which they co-create as part of the design process). Finally, the authors distinguish between indoor and outdoor studies. Finally, they use this taxonomy to inform SUITCASE, an Italian research effort designed to develop novel tools for older people to use in their homes. The authors use this case study to think through the implications of the taxonomy and to push further for direct, participative involvement from older users in ubiquitous computing.

3 Limitations & Opportunities

While this special issue covers some new ground, there are rather obvious limitations in the scope of this issue. For instance, this issue does not cover gender to the extent that

we had originally imagined, although Xaroula Kerasidou’s paper offers a feminist refiguring of ubicomp practice. As Leila Takayama said in an email exchange with the editors, “There are so many categories of human beings and social systems that were missing from PARC during that period of time”. Although the special issue makes some gains, overall, there is much more territory to cover.

Due to a combination of personal issues and professional changes, this special issue has taken two years to come together, starting from a widely circulated CFP in October 2014. We would like to thank our reviewers and our authors for their patience and ongoing engagement throughout that time. Explicitly, we would like to apologize to our authors for the delay, but we believe the end result, both in terms of individual papers and as a whole worth more than the sum of its parts, has been worth it. All papers in this Special Issue received two high-quality reviews from external reviewers in addition to editorial feedback. All papers were revised after initial submission in response to the reviews and feedback. As a co-author, Kaye recused himself from the final acceptance decision on the *Undisciplined Disciples* paper.

Where might we go from here? As Kerasidou writes, there are histories, and then there are (hi)stories. Histories are situational and socially constructed. What might a history of ubicomp look like that considers the 15 years since the first Ubicomp conference and the 15 years of this journal’s publication? What might it mean to configure second-order ubiquitous computing, to borrow from cybernetics, one that looks self-consciously at the uptake of Weiser, Suchman and Xerox PARC by social scientists, designers, architects and media theorists? Might we coarsely envision Ubicomp 2.0? Some of these seminal researchers find themselves today still committed to ubiquitous computing, but under different guises, their focus on materiality and data, ethics, and values in design. What can today’s work on Internet of Things learn from these experiments, experience and paradigms? What might a future of ubicomp look like? We do not attempt to answer that question, but hope that our example in the form of this special issue, recognizing diverse ways of knowing and creating different kinds of knowledge, will itself serve as an exemplar for future work.