HCI's Making Agendas

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Contents

Abstract

In this survey, we examine how making emerged as an interdisciplinary arena of scholarship, research and design that connects entrepreneurs, designers, researchers, critical theorists, historians, anthropologists, computer scientists and engineers. HCI is one among many other fields and domains that has declared having a stake in making. And yet, a lot of what and who defines making is happening outside the familiar research laboratory or design studio. We take this article as an opportunity to reflect on HCI's relationship to making and how this relationship has changed over the last years. Making, we argue, presents HCI with the opportunity to question and revisit underlying principles and long-held aspirations and values of the field. Exactly because HCI and making share some fundamental ideals such as user empowerment and the democratization of participation and technology production, making confronts us with both the potential and the unintended consequences of our own work.

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1

Introduction

2012 might well be called the year of the maker. It was in that year that former US president Barack Obama visited a techshop in Ohio and famously declared that a future of "made in America" was being prototyped at Maker Faires, in makerspaces, and at hackathons. 2012 was also the year in which Pebble smartwatch raised one of the largest Kickstarter campaigns in history, with more than US $10 Million of funding, provided by 68,929 consumers who invested in a future of interconnected devices that the small hardware company promised. To implement this promise, the co-founders would spend the following year seeking partners in the manufacturing region in and around the city of Shenzhen in Guangdong, China, to scale into mass production. Pebble had successfully demonstrated that a move from hobbyist tinkering to mass-produced end-consumer electronics was insofar feasible as it showcased how the combination of crowdfunding and electronics manufacturing in China would enable a whole new generation of technology entrepreneurs to experiment with hardware: platforms like Kickstarter would provide seed capital for hardware start-ups to implement technological visions that might appear too risky for a Venture Capitalist and Shenzhen would be the place where one implemented in practice the move from idea into production.

Excitement was in the air also in scholarly and academic networks. Making appeared to provide - at last - the concrete tools and methods to implement a long-held promise of the tech industry and tech research communities like Human-Computer Interaction (HCI) and Participatory Design (PD): the democratization of technology production [Lindtner and Lin, 2017]. From HCI designers and researchers who saw in making a continuation of their commitment to empower users to governments across regions, large tech corporations like Intel, and venture capitalists to activists, artists, designers, and tech enthusiasts, a range of diverse actors saw something of themselves in one of the key vision of makings: to democratize technology production [Lindtner et al., 2016].

The particular excitement that surrounded making is in many ways reminiscent of earlier techno-optimistic narratives that had risen in the heydays of the Internet and entrepreneurship in software. Social media and digital publishing platforms, in particular, were celebrated as sites of empowerment of many by giving people to the tools and platforms to creatively express themselves, to socially organize, and make money in new ways [Benkler, 2006, Lessig, 2008, Shirky, 2009, Jenkins, 2006a]. Just like content creation and distribution tools—word processors, web and phone cams, Photoshop, iMovie, YouTube—back in the mid to late 2000s enabled anyone with a computer to produce and distribute cultural content, now a variety of hardware tools and maker platforms, paired with the power of digital networks, would allow anyone to make a phone, a computer, a smart watch - so the story went. And just like influential writers would help proliferate a story about a new era of media, software and information, so would an old and new cast of thinkers help spread ideas about making and hardware by means of writing - this includes but is not limited to Neil Gershenfeld's early book on *Fab* [2005], Chris Anderson's book on *Makers: The Third Industrial Revolution* [2005], the writings of Dale Dougherty including blog posts and books (founder of Make Media) as well as "how-to" periodicals from the founders of Arduino and the writers at *Make*. In other words, making and its story of individual empowerment by way of democratizing tech production appeared as if it had transplanted earlier visions of open source software and user participation into hardware. But was

making really just about a transition from software into hardware, from making digital things to making physical things, from coding on machines to making machines?

One of the key differences, we argue, was that the optimistic narratives of making were almost immediately accompanied by sharp criticism. Whose empowerment was this?, many asked. Maker and hackerspaces seemed to advance the interests of masculine and technological elites rather than constituting a space for "everybody" as the promotional campaigns of Make Media and writers like Chris Anderson wanted us to believe [e.g. Anderson, 2012]. It was as if the kind of techno-optimism that had persisted even after and despite the 2000 burst of the dot com bubble [Neff, 2012] had suddenly run out of steam. People began differentiating between hacking as a countercultural practice and making as a commercial endeavor [Maxigas, 2012, Sivek, 2011]. The commercialization of open source 3D printing projects like Makerbot in 2013 made stories of mass empowerment that had fueled so much of the 2012 and earlier rhetoric appear stale at best and co-opted by market capitalism at worst [Söderberg and Delfanti, 2015]. People began critiquing making's underlying premise of producing more and more stuff by turning attention to sites of repair, maintenance, and re-use [Houston et al., 2016, Jack and Jackson, 2016, Jackson, 2014, Jackson and Kang, 2014], but even there making's potential was circumscribed by economic and political forces opposed to reuse and repair [Avle and Lindtner, 2016, Irani, 2015, Lindtner, 2015b, Roedl et al., 2015]. Others challenged making's affinity with "hard" projects (soldering, CNC machines, hardware) and critiqued how, in contrast, craft and many other forms of making were rendered as less technological innovative and hence valued less [Fox et al., 2015, Rosner and Fox, 2016]. In other words, making simultaneously fueled earlier techno-optimistic promises *and* was the site to voice criticism of the political and capitalist gains that such promises granted. Many of these debates did not occur in maker-related networks alone, but were also carried out in the writings and talks of fields like HCI.

In this survey, we outline this process, examining how making emerged as an interdisciplinary arena of scholarship, research and

design that connects entrepreneurs, designers, researchers, critical theorists, historians, anthropologists, computer scientists and engineers. HCI is one among many other fields and domains that has declared having a stake in making. And yet, a lot of what and who defines making is happening outside the familiar research laboratory or design studio [Lindtner, 2014]. We take this article as an opportunity to reflect on HCI's relationship to making and how this relationship has changed over the last years. Making, we argue, presents HCI with the opportunity to question and revisit underlying principles and long-held aspirations and values of the field. Exactly because HCI and making share some fundamental ideals such as user empowerment and the democratization of participation and technology production, making confronts us with both the potential and the unintended consequences of our own work.

If we openly acknowledged and debated such overlapping interests and values, we might raise important questions that often remain silent in the publications and talks at conferences like CHI, e.g., questions about the relationship between HCI design/production and economics, the politics of participation, our relationship to industry and corporate management: What does HCI's strong focus on tool making and problem solving preclude us from seeing? What are the consequences of our commitments to democratize design? How is designing and making of technologies imbricated in the advancement of capitalist interests? What is HCI's position as making oscillates between the promise of building alternative futures on the one hand [Ehn et al., 2014] and the capitalist and economic interests this very promise allowed to pursue? Is HCI furthering a naive promise of a better future for the select few or working alongside those rarely included into conversations on technology production and innovation? In which ways does HCI confront or fail to confront its own affinities and alignments with the ideals and capitalist tendencies of making? How does HCI construe the relationship between making as an ideal and making as an economic project that has brought funding to universities, schools, entrepreneurs? How has HCI construed the tensions and overlaps between making, hacking, DIY, open hardware, craft, repair, and entrepreneurship?

That said, even though we maintain a critical stance throughout this work, we want to stress that in the end we share the optimistic and even utopian goals of maker practitioners and researchers. We believe that making does have the potential to emancipate, democratize, educate, and empower. As three of us wrote in Lindtner et al. [2016], we hope to learn from voices critical of making not to tear anyone down, but rather to help makers pursue their utopian aspirations in a pragmatic, hard-headed, and dogged way.

The survey is structured as follows. In Chapter 2, we summarize the two dominant frames of making research in HCI: the idea that making democratizes computing, innovation, and fabrication; and the idea that the development of new tools and infrastructures is one of the key roles for HCI researchers. Another key role is to develop solid and actionable empirical understandings of makers, both mainstream and those on the edges. Accordingly, in Chapter 3, we examine the maker methods and identity; how/where makers hope to intervene; how this fashionable notion of making relates to much older as well as tangential traditions, including handwork, craft, and repair; and finally how making empowers people to identify as makers and express themselves through making. Then, in Chapter 4, we step back and out of making to look at making's relationship to critique. This includes critiques of making, and it also includes making's critiques of society, including both critical making and also feminist un-hacking.

Throughout this survey, we consider ways that making is used as part of an intervention–into STEM learning, social justice, innovation and entrepreneurship, nation-building, and even reflexively back onto making itself. We share stories of hope, and technical achievements, of sociotechnical breakthroughs, and of coming up short. If we may, our intervention in writing this survey is to bring readers into maker research and practice, to cultivate their appreciation for making's many potentials while shining a critical light on cases of over-optimism and even delusion, and to empower you, our reader, to participate in this project of making making.

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