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ABSTRACT

A fundamental goal of Participatory Design (PD) scholarship has long been the democratisation of technology production. To democratise technology production in PD is a political project, driven in part by the desire to protect and create democratic societies by virtue of opening up computing and design. Recently, DIY (do it yourself) making has come to be seen by PD scholars as rejuvenating such ideals at the heart of their project. Beyond just PD, the idea that making is an ideal avenue to implement societal and political change has been endorsed by a variety of actors from politicians, corporates and activists, across regions. In this paper, we draw from long-term ethnographic research in China and Indonesia to show how making's global appeal does not arise from its supposedly inherent logic of democratisation. Rather, work goes into aligning making with particular political ideals. We found that the political projects and promises people attached to making were highly situated. We propose that by recognising this multitude of promises attached to making we can better understand opportunities for intervention, rather than assume that making will by virtue of its commitment to open-ness and participation inherently lead to a more democratic and participatory society.

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1. Introduction

In the introductory chapter to the 2014 edited volume on *Making Futures: Marginal Notes on Innovation, Design, and Democracy*, Ehn, Nilsson, and Topgaard (2014) propose that 'making' offers a unique opportunity to intervene in dominant approaches to technology innovation. By 'making' the authors refer to a series of grassroots initiatives from fablabs and makerspaces over open source hardware prototyping platforms to DIY (do it yourself) science. This contemporary practice of technology production, the editors and contributors to the volume argue, facilitates alternative futures and practices of 'future making' that move beyond market-driven concerns and challenge the pervasive managerial ethos of user-driven innovation. Fablabs and makerspaces, they suggest, can be seen as 'platforms for broader participation and new ways of collaborative engagement in design and innovation, pointing at alternative forms of user-driven production' (Ehn, Nilsson, and Topgaard 2014). Making, here, is seen as aligning with and further extending long-held values of PD (participatory

design) such as the democratisation of technology design that in turn is envisioned to help enable democratic societies (Muller and Kuhn 1993). Much scholarly work in PD over the last years has sharply critiqued the commodification of PD values through methods such as user-centred design, design thinking, and human-centred design (Bannon and Ehn 2012). Making is seen to intervene here. Prominent advocates of making and digital fabrication, particularly those in the West (e.g. Anderson 2012; Gershenfeld 2008), have promoted making as an intervention into corporate monopoly and existing structures of mass production by proliferating user participation and empowerment via open source toolkits and platforms, cooperative work structures and peer production. PD in other words is not alone in joining a much broader chorus that celebrates making for its commitments to intervene in existing structures of technology production, and by extension in existing structures of power and control.

In this paper, we take the stipulation that making is an avenue to rearticulate participation and political action as the starting point of our investigation. We interrogate how it happened that making came to be seen across diverse regions and varying interests as ideal to intervene in the status quo. Rather than assume as a given that making holds some inherent qualities of democratic or other political potential, we show that it required work to make other people see it in such ways. To demonstrate, we draw from long-term ethnographic research with two transnational DIY making collectives, one primarily located in Indonesia and the other in China, with each being active across regions in Asia, Europe and North America. We show that the *promises attached* to making in these sites were not necessarily about the same democratic tech production, but contingent on specific historical, political and economic processes that varied across regions. When we speak of promises and attachments, we refer to Lauren Berlant's (2011) usage of the terms to focus on—as Berlant puts it—‘the cluster of promises tied to an object,’ with an object constituting anything from a material artefact to an idea or a political project. Our goal is to show how promises of hopeful intervention were attached to making, and how these varied across sites and were rooted in contingent histories and situated hopes for legitimization in transnational technology industry, art and design networks.

Due to limitations of space in this volume, we only focus on a small subset of our findings. In the case of Indonesia, we zoom in on the practices of Lifepatch, a citizen initiative in Yogyakarta, Indonesia, that brings together people interested in DIYbio (do it yourself biology), open source hardware and intersections of art, science and technology. We focus specifically on a transnational collaboration between Lifepatch and a distributed collective of scientists, students and electronic media artists in India and Switzerland that came to be associated with Lifepatch over the years. In the case of China, we explore the work of Seed Studio, a design and manufacturing solution house based out of Shenzhen, Guangdong, in the South of China. Seed Studio has made a name for itself in American and European DIY, maker and hacker networks by providing a series of artefacts such as documents, open source hardware platforms, tools and services aimed at helping DIY makers and hobbyist tinkerers transition into product design and small-batch industrial production.

For each site, we examine in detail the production of a select number of material artefacts. We explore the social, discursive and material productions of these artefacts, and in so doing unpack the ideals and hopeful interventions people attached to and articulated through making. Ultimately, we show how the production of these artefacts was aimed at

repositioning and legitimizing China and Indonesia as sites of technological expertise and critical intervention in their own right.

2. Making and its promises

In Indonesia, the practice of DIYbiology (DIYbio) has become one of the central tenets of an expanding maker/hacker/open innovation community. This focus is visible, for instance, in a range of multidisciplinary collaborations between scientists, artists and hackers that have emerged in Yogyakarta, Indonesia since the 2000s and included projects like a mobile street cart laboratory (Dusseiller 2012), yeast kits and its sonification performances (Kera 2012) and soya leather making (XXLab 2017), noise performances and coding workshops. In 2012, a group splintered from these interdisciplinary efforts and established the DIYbio and citizen science initiative Lifepatch, which has made a name for itself in both local and international networks of technology, art and design, and has won honorary mentions and exhibited widely both in and outside of Indonesia.

Working in both local and transnational configurations, Lifepatch has produced tools, artefacts, exhibitions and machines designed to measure and make sense of the environment. One of Lifepatch's earlier projects was the 'Jogja River Project (JRP),' which brought together DIYbio enthusiasts, scientists from a local university and the *Kali Code* (English: River Code) community, a settlement of people along a river in the city centre of Yogyakarta. JRP was aimed at engaging illegal inhabitants of river settlements in interventions that would address river pollution. In 2013, a group of artists and scientists from Lausanne and Zürich, Switzerland and Bangalore, India joined JRP. In this article, we focus on two artefacts that were produced during this particular transnational collaboration: a water sampling protocol and a digital map visualizing the process of water data gathering. These artefacts enabled Lifepatch not only to demonstrate the relevance of DIY making to citizen science but also to reposition their own efforts as an important contribution to transnational arts, science and technology networks that had formed in Indonesia since the early 2000s.

In China, contemporary ideas and practices of DIY making date back to roughly 2007, when a small collective of transnational Chinese opened up China's first open source hardware companies, hackerspaces and began hosting maker-related events (see more details on the history and practice of DIY making in China in prior publications such as Lindtner et al. 2014; Lindtner 2015; Lindtner, Bardzell, and Bardzell 2016; Lindtner, Greenspan, and Li 2015; Lindtner and Li 2012). One of these early efforts that brought international recognition to China's fledgling maker scene was the work of Seeed Studio. Founded in 2008, Seeed Studio is a for-profit organisation whose main business evolves around enabling hobbyist makers and hardware start-ups to interface with and learn from Shenzhen, a manufacturing hub in the South of China, and the expertise in industrial production and design concentrated there (Lindtner, Greenspan, and Li 2015). Seeed Studio started out as a two-person business that produced a series of artefacts aimed at translating the complexity of professional manufacturing in China into a vernacular familiar to hobbyist makers, engineers, designers and DIY enthusiasts. These artefacts included, for instance, a suite of open source hardware platforms and tools that expanded hobbyist prototyping environments like the Arduino, which had originated from a student-faculty project at the IVREA Design School in Italy just a few years earlier. While Arduino was motivated to enable designers, hobbyists and others without a degree or experience in engineering to

tinker with electronics, the goal of Seed was to help these Arduino-empowered hobbyists transition from prototyping and tinkering to product design.

Seed Studio had quickly garnered significant attention from DIY maker enthusiasts abroad, especially from the United States and Europe, and was soon recognised as an important player in the global maker movement by contributing high-quality open source hardware platforms, tools and services. Within two years, Seed Studio grew from a small start-up to an established business with offices and partners in Silicon Valley, Tokyo, Taipei and several European cities. For the purposes of this paper, we draw out one key artefact that Seed Studio has released early on in their work: the Shenzhen Map for Makers, which laid out specific urban sites in Shenzhen of particular relevance to makers.

Across our two sites, we show how the water sampling protocol, the digital map and the Shenzhen Map for Makers each in their own ways helped expand and legitimize DIY making in transnational science, technology and art networks in both Indonesia and China. In the case of China, the Shenzhen Map for Makers constituted a material entity that both helped realise and make visible the transformation of Shenzhen from a place known as low-quality and copycat production to its contemporary image of the ‘Silicon Valley of Hardware.’ In this process, the work of China’s makers like those at Seed Studio (among others) garnered significant political attention leading to nation-wide policies and new funding streams for maker and entrepreneurial education (Lindtner 2015; Lindtner, Bardzell, and Bardzell 2016).

In what follows, we foreground the kinds of promises Chinese and Indonesian DIY makers and their collaborators attached to DIY making by way of producing and using these artefacts. We show how DIY making came to be seen as carrying the means to realise long-held aspirations of global belonging and legitimate participation in transnational design and technology innovation networks. For a detailed account of our methods and fieldsites, we ask the reader to consult our prior publications, e.g. (Lindtner 2015; Lindtner et al. 2014; Lin and Lindtner 2016; Lindtner, Greenspan, and Li 2015).

2.1. Walking the water sampling protocol

JRP started out with Lifepatch inviting local and international collaborators on walks along the rivers of Yogyakarta. The goal of the river walks was to demonstrate the importance of intervening in how water quality was currently communicated to those whose livelihoods and daily activities depended on the rivers. They were aimed at displaying the opportunities of DIYbio, i.e. a science that engaged citizens as participants in the process of designing and using scientific tools. Lifepatch and its collaborators generated a *water sampling protocol* based on data samples taken from the rivers during the walks. The protocol provided a guide for ‘how to’ sample a river for ‘biomarkers’ that enabled measurements about water quality. In the case of JRP, the ‘biomarker’ was the bacterium *E. coli* to measure the faecal contamination levels in drinkable water bodies.

For Lifepatch, establishing a water sampling protocol was an important step in their attempts to situate their work in relation to what they considered to be internationally established scientific practice and institutions such as the United States Environmental Protection Agency on water sampling and analysis. Throughout JRP, Lifepatch members designed and tested numerous water sampling protocols to devise a localised standard. Making the protocol was not only about adapting scientific methods to a local context; it helped articulate Lifepatch’s role in its transnational collaborations. Situating Lifepatch at

the core of JRP's origins and continuous efforts was crucial to frame their DIYbio work as all but dependent on foreign aid or constituting a developmental effort. Lifepatch did not require foreign interventions or formal institutions to help them conduct their work, its members repeatedly emphasised. Walking a river was positioned by Lifepatch as science enacted, offering a different way of relating to the river and a sampling protocol aimed at demonstrating that boundaries between scientific expertise, DIY biologists and a broader public can be redrawn by a grassroots initiative like Lifepatch.

An important and long-term collaborator of Lifepatch throughout JRP was Sachiko Hirose, a Japanese lecturer and scientist from École Polytechnique Fédérale de Lausanne (EPFL) Switzerland. Hirose and one of the Lifepatch members, Nur Akbar Arofathullah, first met in 2011 during an event hosted by Hackteria.org in Romainmotier, Switzerland. Discovering their shared interest in microbiology, they began working remotely before organising a series of exchanges between students at EPFL and DIYbio enthusiasts in Yogyakarta and Bangalore. Hirose was not only an ally in promoting and legitimizing DIYbio in Indonesia and abroad, she also supported Lifepatch in articulating their practices as a form of knowledge production that challenged common Global North/Global South dichotomies. In her teachings at EPFL, for instance, she would continually emphasise that Indonesian DIYbio had to be taken seriously in its own right:

When I first came here [EPFL], there was interest to do a Master's program in the Global South. The program I visited was not rooted in collaboration with the local people. I felt like it was similar to tourism. It just seems like another neo-colonial power that arises from American students going overseas and that doesn't work with projects locally ... Then I realized this is not what I want to do.

Hirose stressed that there was much scientists from other regions could learn from Lifepatch including its commitments to interdisciplinary education and collective action.

The collaboration between Hirose, her students from EPFL, and Lifepatch had centred on the sampling and analysis of *E. coli* bacteria. Together, they developed 'software, hardware, and wetware,' as Budiarto described it to us. For this work, Hirose gave the team access to relevant scientific literature. While Hirose's input informed Lifepatch's approach to *E. coli*, both sides continuously emphasised Lifepatch's central role in making the protocol standard specific to Indonesia so that it aligned with the 'Standard National Indonesia Water Sampling Protocol'. To frame and subsequently develop a local standard granted Lifepatch legitimacy in local science networks. For instance, Dr. Donny Widiyanto, a scientist at Gadjah Mada University in Yogyakarta, began working with the team to improve the protocol's applicability such as increasing the distribution and types of water sampling spots relative to the water flow and pH level of the river. The making of the water sampling protocol, then, materialised a central promise Indonesian makers attached to DIYbio, i.e. to demonstrate Indonesia itself as a site of expertise in technology innovation.

2.2. Digital river mapping: beyond scientific data

A crucial step in communicating to a variety of stakeholders the relevance of the water-sampling project was to make visible and legible the data collected. To this end, Lifepatch began producing a *digital river map*, spearheaded by Lifepatch member, programmer and artist Budi Prakosa. Prakosa was adamant about using programming languages that were familiar and accessible to other Indonesian developers as well as others less tech-savvy. Lifepatch was

aware that their design choices had the power to either include or exclude others from participation. They reflected on the power of maps to draw boundaries that did not necessarily correspond with lived experiences. Lifepatch member, photographer and architect Wawies Wisnu Widiyanto decided to add a panoramic 360-degree photograph to each location of the sampled data (Figure 1). With this, he attempted to index the data-set retrieved to the physical surroundings that residents were accustomed to, extending the interpretative value of the map beyond scientific data and numbers alone. Both Prakosa and Widiyanto distanced their work from foreign developers and system builders, who they characterised as caring more for the innovative capacity of the code rather than the local context.

Was their approach successful? Was the digital map taken up by local residents and lay audiences? To this date, the river residents have not made use of the protocol or the map to detect river contamination. While on first glance the project seemingly failed as a full-on participatory citizen science project, it delivered something else, perhaps even more important for Lifepatch. The digital river map was successful in that it established Lifepatch members as knowledgeable citizens who could be consulted by river residents. The digital map, in other words, enacted expertise in scientific practice.

The map was also a site to deliberate uneven power relations and histories of colonisation. Cartographic practice and the act of mapping are deeply rooted in the legacies of colonialism in Indonesia as much as elsewhere in the postcolonial world (e.g. Turnbull 1997; Verran 1998). The transnational team was well aware of the legacies of such histories. In a 2014 blog post, Hiro sue detailed her concerns about how mapping needed to be done carefully by rooting it in ‘the narratives and relationships Indonesians have with the river.’ Similarly, Lifepatch insisted that their international partnerships were about mutual learning and partnership. Both positioned their work as challenging any hierarchy that came with traditional understandings of what counts as the centre of knowledge production and innovation. The

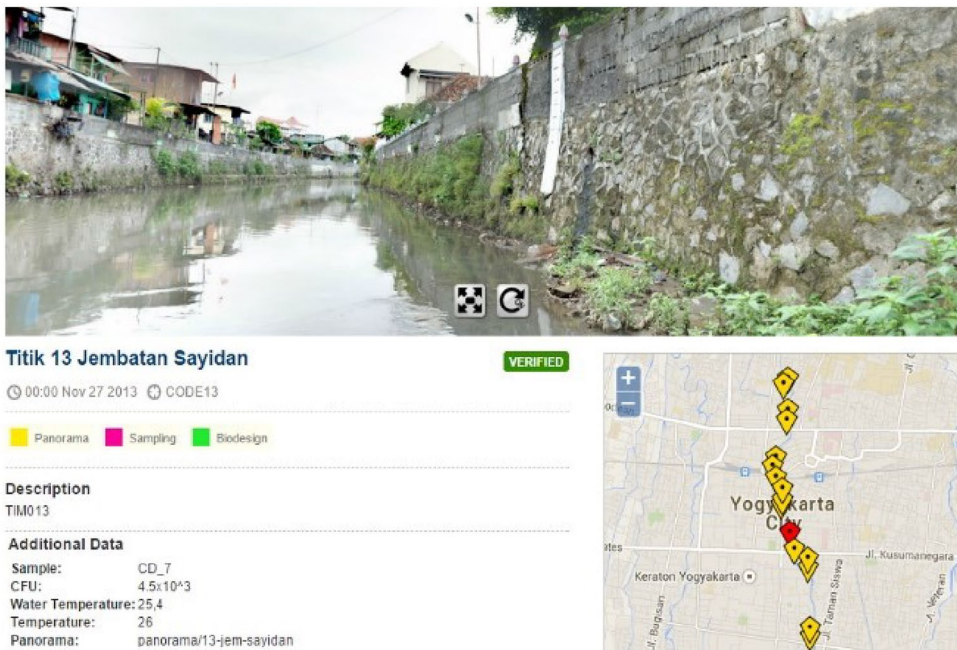


Figure 1. Panoramic photo and the digital river map created by Lifepatch.

map demonstrated that culturally diverse and complex systems cannot be easily reduced to a string of data or a single map. Producing the map demonstrated that technoscientific expertise can emerge from sites typically deemed the tech periphery (Chan 2014).

2.3. The Shenzhen map for makers: making China one artefact at a time

When Sseed Studio began its work in Shenzhen in 2008, very few people in transnational maker and tech production circles had known much about the region in the South of China. This radically changed only a few years later. Within the time span of five years, Shenzhen's image had transformed in the global tech imaginary from a low-quality manufacturing town into a rising hub of hardware innovation. A 2015 Wired documentary highlighted this by celebrating the city as the 'Silicon Valley of hardware,' following a growing number of news media articles and blog posts that had popped up since 2014. A combination of factors such as China's loose regulatory environment, Shenzhen's past of industrial production, and the dropping of costs in hardware, so the story went, would enable the next generation of innovators, i.e. makers and hardware entrepreneurs, thrive and realise their potential by interfacing with Shenzhen. Joi Ito, director of the MIT Media Lab, puts this as follows in a 2014 TED talk after he had toured Shenzhen with a group of engineering students:

What was happening in Shenzhen... they were not making powerpoints or prototypes. They were fiddling with the manufacturing equipment and innovating right there, on the factory floor... The kids in Shenzhen make new cellphones like kids in Palo Alto make websites. So there is a rainforest of innovation going on. What you thought you could only do with software, they are doing with hardware. (Ito 2014)

The Wired documentary and Ito's TED talk are two of many accounts given by prominent figures in the Western tech and media industry that helped shape an imaginary of Shenzhen following in the footsteps of Silicon Valley. These articulations, however, came after and further amplified work that had begun several years earlier, led by members of China's expanding maker and hackerspace scene. Much of their early work in 2007 and 2008 had centred around the enactment of manufacturing as site of expertise by making it legible to transnational tech industries. One artefact that was central to this early project of positioning Shenzhen as a site of expertise was the Shenzhen Map for Makers (see Figure 2), released through Sseed Studio's communication and marketing channels in 2012. This same year, a small but slowly growing number of makers from across different regions in and outside of China had begun travelling to Shenzhen. They leveraged the region's resources in hardware production to produce end-consumer electronics that eventually would be celebrated as quintessential examples of the success of the global maker movement: Internet of Things such as the virtual reality glasses Oculus Rift, DJI Drones, and the Sous-vide cooking tool Nomiku are among the most well-known.

Many of these makers and hardware entrepreneurs agreed that what attracted them to Shenzhen was its culture of 'open-ness', especially towards new business ideas and foreign investment. And yet, many also discussed complications such as misunderstandings between makers and manufacturers over desired outcomes, delayed production or sourcing and low-quality components. Frustrations like these were reported in numerous accounts ranging from personal blog posts to documents released by hardware incubators, that had begun set up shop in Shenzhen since 2012. Often these frustrations were portrayed as demonstrating that Shenzhen still had a long way to go to accomplish the kind of professionalisation of

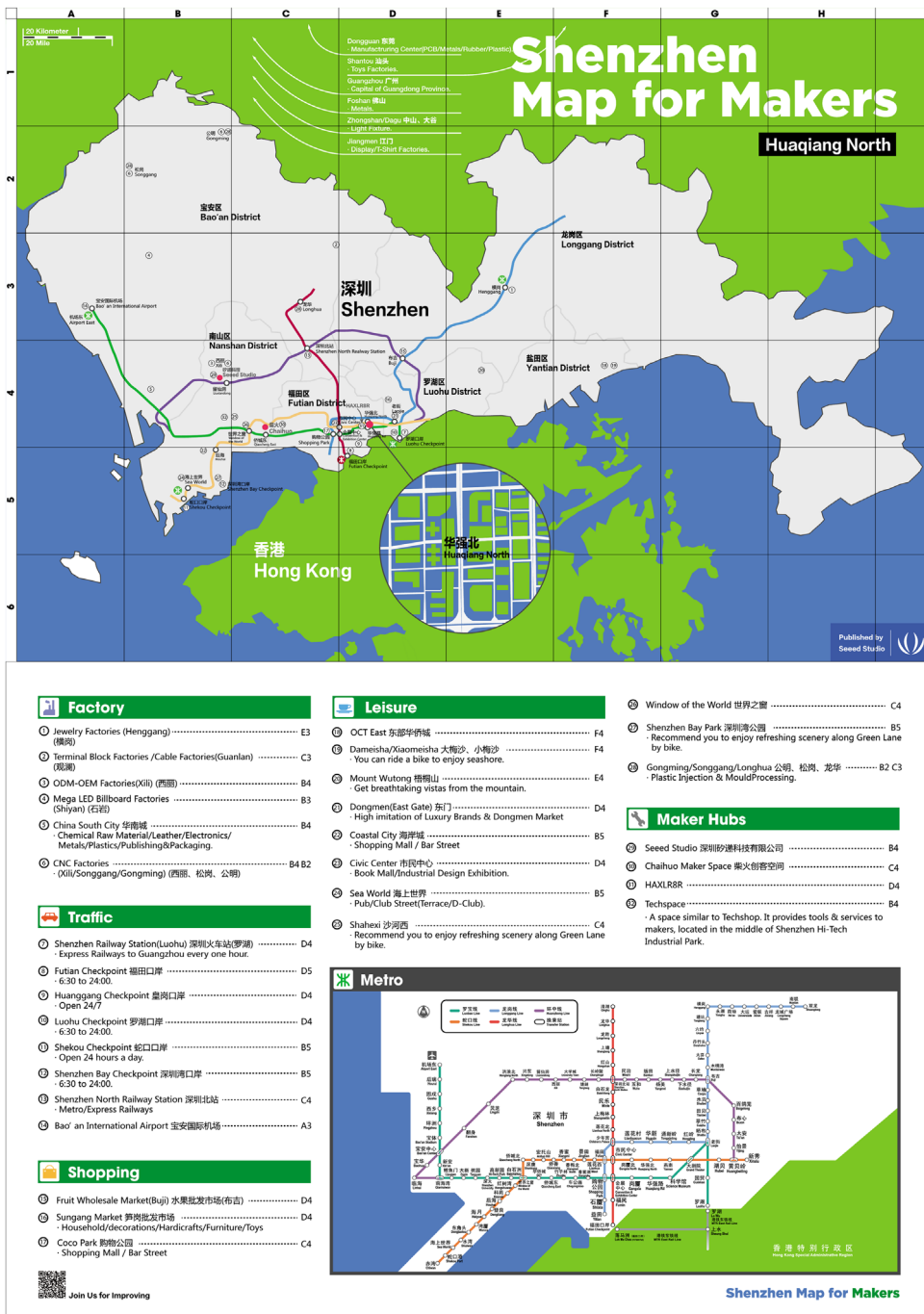


Figure 2. The Shenzhen Map for Makers created by Kevin Lau.

tech business culture that Silicon Valley stood for. While Shenzhen was a well of technological resources and services for hardware production, it was socially and culturally not (yet) well versed in the kind of business acumen that makers, start-ups and venture capitalists considered themselves well trained in, so the story often went.

The Shenzhen Map for Makers was meant in part to intervene in such portrayals of Shenzhen as lagging behind and lacking the kind of expertise concentrated in Silicon Valley. It should demonstrate that Shenzhen indeed was already a rich site of technological innovation and design that makers could productively draw upon if they better understood the region and its cultures on its own terms. The map was a brainchild of Kevin Lau, who was leading at that time Seed Studio's communication, design and outreach division called ECO (short for Marker Ecosystem). Lau's responsibilities included, for instance, the organisation of maker faires, the design of maker booths and product packaging as well as management of the hackerspace Chaihuo. Funded by Seed Studio, Chaihuo's main purpose was to interface with and communicate to a broader public from parents and educators to investors and industrial designers the virtues of making, DIY practice and open source hardware. The map was released across all of these channels, with the aim to reach both makers who came from abroad and a Chinese public of parents, educators, politicians and others who would attend Seed Studio's events or read its newsletters.

The Shenzhen Map for Makers deployed a designerly vernacular familiar to those working in the design and tech industries. Its aesthetics are reminiscent of a range of designerly artefacts, often released for free and in both print and digital form, from design thinking toolkits to user experience design and city mapping guides. Its bold colours, non-serif fonts and 2D-iconography should communicate how a maker can best navigate the city. The centre of the map displays a scaled-up grid view of the 15-by-15 city block area of the electronic markets Huaqiangbei 华强北. The map, here, made visible and enacted what became over time taken for granted knowledge, i.e. that the Huaqiangbei Electronic Markets constituted one of Shenzhen's core assets for makers, and especially Western makers, who emphasised how often they felt removed from the inner workings of contemporary industrial production (Lindtner, Greenspan, and Li 2015). As a messy and wondrous labyrinth of vendors, traders and component producers, who put on display and for sale anything from the tiniest component and printed circuit board to wires, LEDs and finished products, the markets made production tangibly real. 'Shenzhen is like living in a city-sized techshop,' commented Zach Hoeken Smith, co-founder of the in maker circles well-known 3D printing company Makerbot, to describe what Huaqiangbei meant for makers like him. Over the years, the markets became interspersed with co-working and incubator spaces, food stalls and coffee houses, merging the feel of a production city with the globally recognised aesthetics of creative work and venture labour (Gregg 2011; Neff 2012).

The Shenzhen Map for Makers, then, made concrete this idea that had begun to surface in the global maker scene since around 2012, i.e. that the whole city of Shenzhen constituted a unique laboratory to experiment with the hardware innovations of tomorrow. Although one can download the map online, it was often distributed in printed form at Chaihuo, at local Maker Faires, workshops and design events dispersed throughout the city. While we have not seen the map being used for its supposed purpose, i.e. to guide makers through the intricacies of the Huaqiangbei markets or the city's districts in the outskirts where most of the factories are located, it took on another, perhaps more important, role: travelling in the pockets and suitcases of visitors on their way home from the latest Shenzhen Maker Faire, their visits to Chaihuo or Seed Studio, it was an artefact to look at and to remember and imagine the technological possibilities that Shenzhen promised to help passionate makers realise. It promised that the complexities of Shenzhen and with it the intricacies of Chinese manufacturing could eventually be conquered. The purpose of the map was not

necessarily to guide makers literally through the city. Indeed, the city itself, and especially the Huaqiangbei markets, have been changing too rapidly for a physical map to make sense as a literal guiding tool. As a thing to look at, however, with an aesthetic familiar to the transnational maker, designer and engineer, it also rendered Shenzhen itself more familiar. Particular places and elements of the city, in other words, were translated into a language of innovation, design and DIY.

In this sense of translation work, the map also contributed to a project that Shirley Feng, director of the Shenzhen Industrial Design Association (SIDA), an entity of the city government of Shenzhen, had been busy with since 2007: the establishment of Shenzhen as city of design. When SIDA and with it the city government sponsored Shenzhen's second featured Maker Faire and Maker Week in 2015, Feng had the Shenzhen Map for Makers reproduced as a version specifically branded by SIDA. This second version of the map, thus sanctioned by the city government, kept with the basic idea and aesthetics, but expanded what was featured on the map based on SIDA's own connections to manufacturers, incubators, educational programs and other entities in the city. The Shenzhen Map for Makers as such was continuously 'done' as it was mobilised in and through various different social and material relations, e.g. when put up at the hackerspace or when distributed in a refurbished manner by the city government at the 2015 Maker Faire. Its continuous production and circulation, so to say, then also allowed different actors form unique attachments to the idea of DIY making itself by way of taking up or pointing to the map in different ways.

Various people from the director of the MIT Media Lab to China's makers active at Chaihuo and members of the Shenzhen city government became invested in the promise of a renewed Shenzhen—a rising innovation hub. The production, circulation and distribution of the map in part enabled and constrained this very process of claiming stakes in Shenzhen's unique promise of a future of innovation. The mapping of Shenzhen opened up specific parts of city to a gaze of innovation, i.e. it made particular sites like the electronics markets readable and legible to a transnational audience of tech producers. In this process of mapping Shenzhen through a transnational lens and aesthetics of innovation, Chinese manufacturing and with it China itself were repositioned as sites of expertise. The making of the Shenzhen Map for Makers, in other words, in part produced (alongside other artefacts and efforts) what is by now a largely taken for granted reality, promoted by the likes of Wired UK: Shenzhen was made to be seen as a rising hub of innovation—the Silicon Valley for Hardware.

3. Conclusion

Across regions, people have attached ideals of hopeful intervention to making. PD scholars, for instance, see in making an opportunity to rejuvenate and potentially even amplify long-held values to enable the build up of democratic societies by means of participatory technological design. Prominent figures of the so-called maker movement such as Dale Dougherty, founder of Make Media, see in making a promise to regain control over the means of production (Lindtner, Greenspan, and Li 2015). This promise of making was later taken up by the Obama administration with the slogan of making as an enabler to bring back 'made in America.' What is already visible in these two examples alone is how varied the promises attached to making can be; from ideals to proliferate democracy in the context of PD scholarship to the rejuvenation of old industries as promoted by an American politician.

Yet certain promises of making have become more dominant than others. While media outlets have picked up the (arguably quite Euro-American-centric) story about making as an enabler of democratic tech production, individual empowerment, and upgrade of old industries, there is comparatively little reported on the promises and desires attached to making as we have reported in this paper. The kinds of promises attached to making across our fieldsites in China and Indonesia were oriented towards intervening in dominant perceptions of where a truly democratic maker project or authentic innovation was to be located in the first place. While our interlocutors were engaged in the kinds of conversations that occurred at Make Media and at international Maker Faires, for them the promise of making was about implementing political interventions of a different kind. For instance in the case of China, making was not about bringing back ‘made in’ by democratizing tech production. Rather, their work was driven to show that technology design and innovation cultures in the West had long rested on and in many ways been enabled by expertise in China. Similarly, the DIYbio collective in Indonesia was driven to reposition their own work in the global tech imaginary from a site in need for foreign developmental aid to an originator of technoscientific advances. In their work, they were focused on making visible the interregional relationships that have long been cultivated between Indonesia and the rest of the world to show a possible future of a more egalitarian science that recognises the many contributions of the so-called third world.

In both cases, the projects of China’s and Indonesia’s makers, then, were not less hopeful or less interventionist as the project of making in PD (Björgvinsson, Ehn, and Hillgren 2010; Ehn, Nilsson, and Topgaard 2014). Rather, they show how political interventions are necessarily situated and contingent on specific histories of exploitation, control and power. A strong political intervention starts from recognising divergent positionalities and standpoints. The kinds of interventions people hoped to accomplish through making were contingent on each region’s continuing and ambivalent struggle to push back against continuous domination by those deemed more technologically, socially, or economically advanced (e.g. the West).

A reviewer of an early draft of this article stipulated that an authentic PD was not ‘compatible’ with China and Indonesia, given their structures of government and their—as the reviewer put it—lack of democratic societies. Following an expanding body of work on postcolonial and transnational studies of computing (e.g. Avle and Lindtner 2016; Dourish and Mainwaring 2012; Irani et al. 2010; Taylor 2011; Williams et al. 2014) an underlying goal of this article is to show the consequences of such Euro-American centric views of what counts as truly participatory or as ‘real’ intervention into the status quo. Our interlocutors themselves challenged such naturalising views of their regions or that there was any pure form of political intervention enabled by making. For their political project was exactly to challenge the view that their efforts in China and Indonesia would be inherently incapable of democratic intervention or innovation thinking. Their efforts were in this sense not in a spirit of nationalism, but in a spirit of rearticulating and intervening in the dominant (often Western) discourse of design and innovation.

Elsewhere, we have argued for the importance to neither shut down making with critique nor naively endorse its underlying technosolutionism, i.e. the idea that technology provides solutions to complex social problems (Lindtner, Bardzell, and Bardzell 2016). We proposed a practice of ‘anticipatory design,’ i.e. a reflexive-interventionist approach that simultaneously takes seriously the critiques of making’s claims as technosolutionist while

also embracing its utopian project as worth reconstituting in broader sociopolitical terms. This paper follows from there by advocating to see the multitude and highly situated nature of hopeful interventions attached to making. Making does not in and of itself and by virtue of its commitments to open source and collaboration lead to political change. Only if we recognise that it takes work to do so and that making's utopian ideals are culturally and historically situated, can we begin to amplify its potential opportunities for political change.

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References

- Anderson, Chris. 2012. *Makers: A Nova Revolução Industrial*. Rio de Janeiro: Campus.
- Avle, S., and S. Lindtner. 2016. "Design(ing) 'Here' and 'There': Tech Entrepreneurs, Global Markets, and Reflexivity in Design Processes." In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems (CHI '16)*, 2233–2245. New York: ACM.
- Bannon, L., and P. Ehn. 2012. "Design Matters in Participatory Design." In *Routledge Handbook of Participatory Design*, edited by J. Simonsen and T. Robertson, 37–63. New York: Routledge.
- Berlant, Lauren. 2011. "The Commons: Infrastructures for Troubling Times." *Environment and Planning D: Society and Space* 34 (3): 393–419.
- Björgvinsson, Erling, Pelle Ehn, and Per-Anders Hillgren. 2010. "Participatory Design and "Democratizing Innovation"." In *Proceedings of the 11th Biennial Participatory Design Conference (PDC '10)*, 41–50. New York: ACM.
- Chan, A. S. 2014. *Networking Peripheries: Technological Futures and the Myth of Digital Universalism*. Cambridge, MA: MIT Press.
- Dourish, P., and S. D. Mainwaring. 2012. "UbiComp's Colonial Impulse." In *Proceedings of UbiComp'12*, 133–142. Springer.
- Dusseiller, Marc Duszjagr. 2012. "MobileKitchenLab Workshop, MicroCells#02, Yogyakarta." *Hackteria.org*, January 25. Accessed March 7, 2017. <http://wlu18www30.webland.ch/wordpress/workshops/mobilekitchenlab-workshop-microcells02-yogyakarta/>
- Ehn, Pelle, Elisabet M. Nilsson, and Richard Topgaard. 2014. *Making Futures: Marginal Notes on Innovation, Design, and Democracy*. Cambridge, MA: MIT Press.
- Gershenfeld, Neil. 2008. *Fab: The Coming Revolution on Your Desktop—From Personal Computers to Personal Fabrication*. New York: Basic Books.
- Gregg, Melissa. 2011. *Work's Intimacy*. Hoboken, NJ: Polity.

- Irani, Lilly, Janet Vertesi, Paul Dourish, Kavita Philip, and Rebecca E. Grinter. 2010. "Postcolonial Computing: A Lens on Design and Development." In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '10)*, 1311–1320. New York: ACM.
- Ito, Joi. 2014. "Want to Innovate Become a 'now-ist.'" *TED Talk*. Source. Accessed January 2017. https://www.ted.com/talks/joi_ito_want_to_innovate_become_a_now_ist/transcript?language=en
- Kera, Denisa. 2012. "Hackerspaces and DIYbio in Asia: Connecting Science and Community with Open Data, Kits and Protocols." *Journal of Peer Production* 2 (Jun): 1–8.
- Lin, Cindy, and Silvia Lindtner. 2016. "Legitimacy, Boundary Objects & Participation in Transnational DIY Biology." In *Proceedings of the 14th Participatory Design Conference: Full papers-Volume 1 (PDC '16)*, edited by Claus Bossen, Rachel Charlotte Smith, Anne Marie Kanstrup, Janet McDonnell, Maurizio Teli, and Keld Bødker, 171–180. New York: ACM.
- Lindtner, S., Hertz, G., and Dourish, P. 2014. "Emerging Sites of HCI Innovation: Hackerspaces, Hardware Start-ups & Incubators." In *Proceedings of ACM Conference Human Factors in Computing Systems CHI'14*, 439–448. New York: ACM.
- Lindtner, Silvia. 2015. "Hacking with Chinese Characteristics: The Promises of the Maker Movement against China's Manufacturing Culture." *Science, Technology & Human Values* 40 (5): 854–879. doi:10.1177/0162243915590861
- Lindtner, Silvia, Shaowen Bardzell, and Jeffrey Bardzell. 2016. "Reconstituting the Utopian Vision of Making: HCI After Technosolutionism." In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems (CHI '16)*, 1390–1402. New York: ACM.
- Lindtner, Silvia, Anna Greenspan, and David Li. 2015. "Designed in Shenzhen: Shanzhai Manufacturing and Maker Entrepreneurs." In *Proceedings of The Fifth Decennial Aarhus Conference on Critical Alternatives (AA '15)*, 85–96. Aarhus: Aarhus University Press.
- Lindtner, Silvia, and David Li. 2012. "Created in China: The Makings of China's Hackerspace Community." *interactions* 19 (6): 18–22.
- Muller, Michael J., and Sarah Kuhn. 1993. "Participatory Design." *Communications of the ACM* 36 (6): 24–28.
- Neff, Gina. 2012. *Venture Labor: Work and the Burden of Risk in Innovative Industries*. Cambridge, MA: MIT press.
- Taylor, Alex S. 2011. "Out There." In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '11)*, 685–694. New York: ACM.
- Turnbull, David. 1997. "Reframing Science and Other Local Knowledge Traditions." *Futures* 29 (6): 551–562.
- Verran, Helen. 1998. "Re-imagining Land Ownership in Australia." *Postcolonial Studies: Culture, Politics, Economy* 1 (2): 237–254.
- Williams, Amanda, Silvia Lindtner, Ken Anderson, and Paul Dourish. 2014. "Multisited Design: An Analytical Lens for Transnational HCI." *Human-Computer Interaction* 29 (1): 78–108.
- XXLab. 2017. "Female Collective on Art, Science and Free Technology." Accessed March 7, 2017. <http://www.xxlab.honfablab.org>