Design Narratives: From TXTMob to Twitter

Published on: Feb 27, 2020

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Figure 3.1 "Analyzing Design Narratives," from *Design Justice Zine*, no. 1: Principles for Design Justice (ed. Una Lee, Nontsikelelo Muttti, Carlos Garcia, and Wes Taylor). Designed by Nontisikelelo Mutiti and Alexander Chamorro. Available at http://designjustice network.org/zine.

> Designing is not a solitary activity. It is a part of a larger social community of discourse.
>
> —Drew Margolin

> People are aware that they cannot continue in the same old way, but are immobilized because they cannot imagine an alternative. We need a vision that recognizes that we are at one of the great turning points in human history when the survival of our planet and the restoration of our humanity require a great sea change in our ecological, economic, political, and spiritual values.

> —Grace Lee Boggs

It is Sunday, August 29, 2004, and I'm marching in midtown Manhattan with a crowd of more than half a million people during protests outside the Republican National Convention. Most are there to voice opposition to the US war in Iraq, at a rally organized by the antiwar coalition United for Peace and Justice. The invasion of Iraq and Afghanistan, and the so-called war on terror, launched by George W. Bush in 2003 based on what would ultimately be shown to be false information about chemical weapons,[1] would drag on to become the longest armed conflict in US history. The war cost at least 5.6 trillion dollars,[2] with estimates of between one hundred thousand and one million casualties to violent death, the vast majority of them civilian.[3] At this moment, the Iraq War is still less than two years old.

Today's mobilization is part of a growing cycle of struggles.[4] On February 15, 2003, global civil society and social movement networks organized the largest simultaneous day of protest in human history.[5] We were able to coordinate this action partly through the use of networked information and communication technologies (ICTs; at the time, mostly email lists, Internet Relay Chat, and Indymedia open publishing sites), combined with the strong personal and organizational social movement networks that we developed over two decades in the global justice movement. The February 15 date was cosigned by thousands of organizations from around the world, during the World Social Forum that took place the previous January in Porto Alegre, Brazil. Although we failed to stop the war before it began, in the early days of 2004 it still seemed possible to many of us that the US presidential election might be an opportunity to quickly end the war.

The massive march has been entirely peaceful, but there is a tense atmosphere because our path is controlled by hundreds of police officers at multiple intersections. I am marching with my sister and parents. We reach a spot where the crowd has come to a standstill. Police with batons block our way. Suddenly, a surge of bodies pushes us backward as a line of officers mounted on horseback rides single-file through the crowd; everyone scrambles to get out of the way. A few feet from us, one of the mounted police suddenly rears his horse up onto its hind legs; hooves fly through the air, dangerously close to an elderly woman who cries out and ducks for cover. My sister, Larissa, grabs onto my arm, and one of us says something like "What the fuck?!" We back away quickly and try to make our way to a less chaotic part of the mobilization.

Police have already arrested hundreds of protesters during the previous two days; on Thursday, twelve ACT UP! activists were arrested for a naked protest against Bush's regressive global AIDS policies. On Friday, 264 people were arrested during a huge Critical Mass bicycle ride of five to six thousand riders.[6] Overall, during the course of the convention and the protests, more than 1,800 people, including protesters, bystanders, legal observers, and journalists, will be arrested, fingerprinted, and held in makeshift pens in a toxic former bus depot. The vast majority (more than 90 percent) will face charges that will be dropped or thrown out of court, and ultimately (ten years later, in 2014), New York City will settle a class-action suit by the ACLU for nearly $18 million—the largest protest settlement in US history.[7]

After another hour or so, I say goodbye to my family and make my way to the makeshift, semiclandestine Independent Media Center (IMC, or Indymedia) that has been set up to cover the protest. The IMC is a hub of frantic activity. In one corner, a young woman imports footage of police violence from at least three different kinds of handheld video cameras (mini DV tape, hard disk drive, and VHS-C) into the editing software Final Cut Pro. Some of this footage will be uploaded quickly to Indymedia (YouTube does not yet exist); some will be used later by legal support teams to ensure that most of the arrests are thrown out of court (and still later as evidence in the class action suit); some will be used to produce documentary films about the event, such as *We Are Many*.[8] In a side room, a small team works to produce audio for a podcast and to send clips to various radio stations affiliated with the listener-supported Pacifica radio network. My task is to gather and confirm reports of various actions, arrests, and incidents of police brutality that are coming in from across the city via phone calls, emails, text messages, and uploads to the Indymedia open publishing newswire.

As I do this, to remain in close coordination with other media activists around the city and around the world, I'm logged in to the Indymedia Internet Relay Chat (IRC) server and participating in several relevant channels. IRC channels are dedicated, persistent, chat-based conversations, marked by the pound sign—for example, #RNCarrests for conversations about arrests at the Republican National Convention. The # (pound sign or hash) marker for conversations on activist chat servers would later make its way into much broader use in the now-ubiquitous social media feature we know as *hashtags*.[9] It should not be surprising that the ability to create ad hoc groups, or ongoing conversations, instantly with the pound sign was pioneered by hackers and activists, and yet today this is not widely known. On IRC, I receive a message from a friend who uses my handle, @schock, to notify me; using the @ (at) sign to notify a

particular user in a channel that you have sent them a message is another feature that was imported from IRC into many social media platforms today. He wants to know whether I have successfully signed up for TXTMob.

TXTMob is an experimental group short message service (SMS) application that was developed by design professor Tad Hirsch, who at the time was a graduate student at the MIT Media Lab.[10] At the RNC in New York, hundreds of people, most of them seasoned activists, used TXTmob to coordinate, share verified information about actions in the streets, and keep abreast of police activity. Although it was designed to work via SMS and therefore could be used on nearly any mobile phone (remember that almost no one had a smartphone in 2004), it was not widely adopted beyond activist circles. It was a student project, with poorly written code, and it used a clunky hack to send SMS for free: it took advantage of the email-to-SMS gateways that nearly all mobile operators made available at the time. Indeed, if hundreds of thousands of protesters had all signed up for TXTMob, the tool quickly would have been blocked by mobile service providers once they noticed the volume of messages being sent without payment. In any case, TXTmob mostly worked. It provided a useful information sharing service to its small group of highly connected activist users. It helped increase the circulation speed of verified information, helped direct action affinity groups make tactical decisions about which street corners to blockade, and helped confirm key developments and dispel some of the false rumors that tend to spread like wildfire during mass protests.[11]

After the RNC was over, Tad Hirsch met with Gaba Rodriguez, Rabble, Blaine Cook, and other activist developers at the Ruckus Society SMS Summit in Oakland to talk about the state of SMS tools for activism, including what had worked well at the RNC and what needed improvement.[12] For their day jobs, Gaba, Rabble, and Blaine worked at Odeo, a podcasting startup that was rapidly running out of seed money. Although the company had a decent product, there were not enough people creating or listening to podcasts at the time to create a sustainable business model. The death blow came when Apple announced that iTunes would soon launch a podcasting product. With only enough seed money to pay for a few more months of payroll, the Odeo employees decided to mostly abandon work on their main product and switch over to hacking on other potentially interesting projects that might be able to attract new investors or spin off into their own companies. To kick off this process, Odeo held a demo day during which various teams put together project ideas, presented them, and then decided what to work on for their remaining salaried time.

One team, led by the hacker-activists who had been part of the RNC protests, presented TXTmob. They talked about the tool in the context of the protests: what had worked well, what failed, and what features of the tool might be compelling for a broader set of possible users. For example, account creation and group signup were both very clunky in TXTmob, so those would have to be improved. The method of sending SMS via telecommunications company (telco) gateways wouldn't scale beyond a few hundred or a few thousand people, so that would have to change as well. However, the team argued, there was a lot of potential in a group SMS application focused on providing real-time updates. Others at Odeo agreed. Over the next few weeks, TWTTR (Twitter's original name) was born, and as they say, "the rest is history."[13] In the context of design justice, however, we must ask: *Whose version* of history?

The story that I have just narrated about the origins of Twitter is not widely known. Instead, as Hirsch writes: "Nick Bilton's October 13 New York Times Magazine story, 'All's Fair in Love and Twitter,' describes the heady, early days of Twitter. The article begins with [Twitter cofounder] Jack Dorsey sitting atop a slide in a 'rinky dink' Silicon Valley playground sometime in 2006, expounding his vision of a microblogging platform to a handful of Silicon Valley techies and entrepreneurs who would go on to create one of the most popular web services in the world. … It's a compelling story. Unfortunately, it isn't true."[14] Hirsch, who is now the chair of Art and Design at Northeastern University, is not interested in claiming that he is the "actual" inventor of Twitter. Instead, in a clear and compelling article that is worth quoting at length, he describes his interest in setting the record straight:

> To be clear, TXTmob wasn't Twitter. The Twitter team made a number of key innovations that allowed the project to scale, and to attract investors. Further, pointing out that TXTmob played a role in Twitter's creation is in no way to suggest that Evan, Blaine, Jack Dorsey, or anyone else stole anything from me. TXTmob was an open-source project that I freely shared. The folks at Odeo took this project and adapted it for mainstream use in ways that I frankly did not anticipate. And while I wouldn't object if one of the Twitter millionaires decided to send along a few "thank you" shares, I don't believe that they are under any obligation to do so … However, I do think it is important to get the story right. As Bilton observes, creation myths matter. They don't simply tell how things happened, they tell us who we are. Jack Dorsey clearly needs to believe that he's not just clever (and lucky), but that he's a rare breed of genius. It's also probably important to Twitter's employees and investors to believe this too. The problem

> with Dorsey's story, for the rest of us, is that it describes a world where the market is the sole site of technical and social innovation, and where we are wholly dependent on a handful of extraordinarily gifted entrepreneurs to lead us out of the dark ages. This is a myth. The truth is that Twitter—or something very nearly like it—would almost certainly have happened without Jack Dorsey. However, it might very well not have happened without the long progression of earlier tinkerers and dreamers, who often worked well outside the confines of the market. Their collective efforts paved the way for many of the technical marvels we now enjoy, and we should take care to ensure that they are not written out of the histories of the extraordinary age in which we are living.[15]

This chapter is about how design narratives provide an important arena of contestation for the theory and practice of design justice. Design justice means that we consider the values that we encode in the objects and systems we design, as we discussed in chapter 1, as well as who gets to participate in and control design processes, as we discussed in chapter 2. It also means that we think about design narratives: who receives attention and credit for design work, how we frame design problems and challenges, how we scope design solutions, and what stories we tell about how design processes operate.

Smart Men and Start-Ups: Innovation, Attribution, and Appropriation

What is innovation, beyond a buzzword? There is a burgeoning corporate literature that promises to reveal the "secrets" of innovation, full of titles like *The Innovator's DNA: Mastering the Five Skills of Disruptive Innovators*[16] and *The Art of Innovation: Lessons in Creativity from IDEO, America's Leading Design Firm*.[17] There is also considerable attention to the subject within the academy. Subfields of economics, management studies, and design, as well as urban studies and planning, anthropology, sociology, and science and technology studies seek to better understand various aspects of innovation and innovators. Works in the history of science and technology often unpack how a particular technological innovation unfolded over time.[18]

Popular narratives about innovation are dominated by the figure of the genius. In popular culture, we are often led to believe that all technology is created by brilliant, well-educated, mostly white (cis)men, working in university labs, corporate R&D departments, or perhaps in their garages, who go on to found Silicon Valley start-ups. This narrative is tightly entwined with the mythology of meritocracy: people get what

they deserve, and if you work hard enough, you will achieve your dreams.[19] Yet, as public health scholars Naa Oyo A. Kwate and Ilan H. Meyer put it in 2010: "There is often a disjuncture between America's meritocratic values that promote aspiration for success and the opportunity structure—the social, economic, and political structures that make success possible. The problem is that opportunities are not equally distributed, and they are not allotted solely by meritocratic criteria. For example, racism serves as a strong barrier to African American's achievement. Even if unintended, the promise of equality inherent in meritocratic ideology serves to elide racism."[20] The opportunity structure is not only raced, it is also gendered, as feminist legal scholar Deborah L. Rhode has described.[21] Even as access to key jobs in the information economy is structured by linked white supremacy, heteropatriarchy, class inequality, ableism, and other aspects of the matrix of domination (as discussed in chapter 2), this reality is obfuscated by the mythology of meritocracy. In other words, many white (cis)male technologists believe that their position as "innovators" and access to the attendant benefits (salaries, titles, credibility, prestige) are based primarily on their raw talent and individual brilliance. However, access to these positions is shaped by structural inequality, even as sociotechnical innovations frequently emerge from marginalized communities but are then appropriated by powerful actors. Indeed, user innovation is the norm, not the exception to the rule.

Still, the *diffusion of innovation* remains the most widespread theory about how innovation works.[22] In this model, innovators (scientists, researchers, inventors, technologists) create a "new technology." Over time, if it is a useful invention, this new technology "diffuses" or spreads out from the epicenter of its site of invention. It is taken up first by "early adopters," then moves into broader distribution, and finally is adopted by nearly everyone, save a few holdouts or laggards. The model is illustrated in figure 3.2. Although this model remains influential, scholars of science and technology have challenged it on several grounds. First, it contains a somewhat masked normative assumption that "technology adoption" is always a good thing. To illustrate, simply imagine this model applied to a technology that is widely recognized to be harmful—for example, personal ownership of military assault rifles, or crack cocaine and crack pipes. Second, it has nothing to say about the many factors that might influence the adoption of desired technologies—most obviously, wealth disparity, but also gendered and raced cultural norms, among many other variables. Third, diffusion theory imagines technologies as static, although technological objects and the ways they are used (sociotechnical practices) are constantly changing. Early versions of a new technology are nearly always quite different from later mass-market

versions. Not only is innovation iterative, but many, if not most, small changes (iterations) to a given technology are made by everyday people (users), rather than by professional scientists, researchers, or product designers.

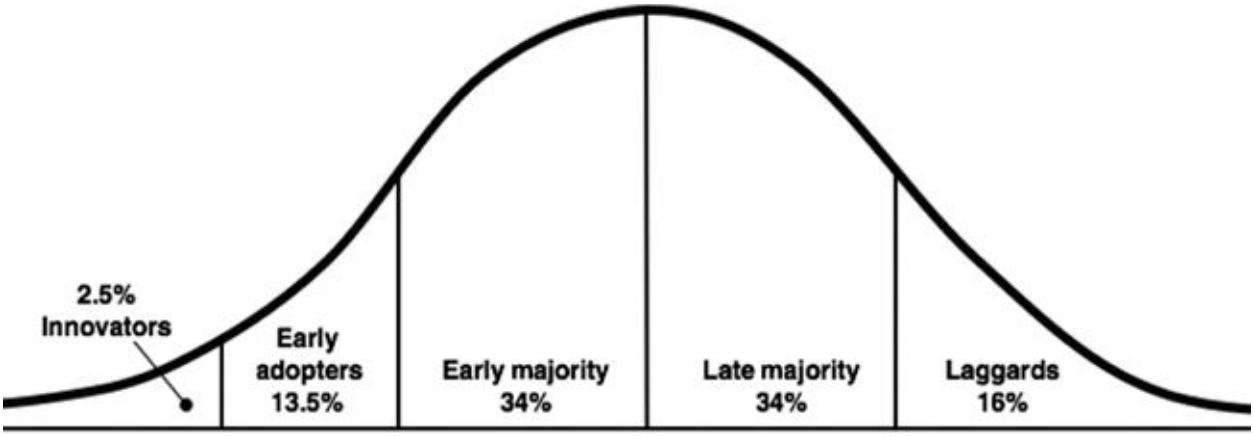

Figure 3.2 Diffusion of innovation. *Source:* Rogers 1962.

The prevalence of user modification is the core insight of the theory of technology appropriation. As technology scholars François Bar, Matthew S. Weber, and Francis Pisani put it, "Appropriation is the process through which technology users go beyond mere adoption to make technology their own and to embed it within their social, economic, and political practices."[23] For example, they trace the history of mobile money, which began as a user innovation, to illustrate what they call the *cycle of technology appropriation*. Initially, Kenyan mobile users appropriated prepaid top-up cards and repurposed them as a form of payment: they purchased cards, then sent the card numbers to other users via SMS. Later, mobile phone companies noticed the user innovation and launched mobile payment services (like M-Pesa) bundled with their phones. The authors argue that user appropriation is a key, but often overlooked, part of most innovation processes.[24]

The theory of technology appropriation is similar to lead user innovation theory, discussed in the previous chapter. In his text *Democratizing Innovation*, MIT management professor Eric Von Hippel both theoretically and empirically demonstrates that a significant portion of innovation is actually done by users, rather than manufacturers.[25] Further, he finds that particular kinds of users (lead users) are the most likely to innovate and that their innovations are more likely to be attractive to a broader set of users. In design justice terms, those whose needs have long been marginalized within the matrix of domination have a strong information advantage when it comes to articulating those needs and developing possible solutions. In terms

of information costs, a user, user community, or small organization rooted in a marginalized community thus is often best positioned for innovation. This is due both to the high amount of specialized domain knowledge they possess and to the low costs of testing possible solutions in the real-world "laboratory" of daily life.[26] This means that knowledge "extraction" is not only unjust, it is also costly and inefficient. Von Hippel makes a compelling generalized case for why manufacturers and users tend to innovate based on the information that they already possess and for why lead users should be included in design processes. Design justice extends this observation to consider the ways that the matrix of domination (race, class, gender identity, sexual orientation, disability, age, language, and so on) structure participation in and exclusion from product design, development, and manufacturing. In Von Hippel's terms, the difficulty of sharing both use context and solution information decreases the likelihood of product innovation that centers the specific needs of marginalized users; information stickiness suggests that users with lived experience of the design challenge should be incorporated into any design team.

Attribution: Giving Credit Where Credit Is Due

Von Hippel provides a compelling argument with great potential to shift larger narratives about technology design. However, in practice, his work has mostly been used to help firms develop strategies to encourage lead user innovation, then appropriate user innovations to increase their own profitability. In contrast, one of the key principles of design justice is full attribution. Under white supremacist capitalist heteropatriarchy and settler colonialism, the work, ideas, inventions, belongings, land, and very bodies of women, Black people, people of color, and indigenous peoples have been appropriated (stolen) for centuries by wealthy white (cis)men. This process is perhaps most extreme, most visible, and most acceptable to talk about today as something that took place historically during the age of colonialism, empire building, and the transatlantic slave trade.

However, the theft of others' labor, time, energy, culture, innovations, and ideas, as well as land and bodies, by those in positions of structural power continues today. Design practices, norms, and institutions are by no means immune to this dynamic. Instead, as design becomes increasingly central to economic, cultural, and social life, if anything there is increased pressure toward appropriative design strategies. As design gains power, the stakes become higher. Design jobs are increasingly lucrative, and competition for contracts, investors, "intellectual property,"[27] and visibility are fierce.

The typical capitalist firm is arranged in a pyramid structure, so that resources (time, energy, credit, money) flow from bottom to top. This is also the case within most design firms. At the extreme, in large multinational design enterprises, armies of poorly paid underlings labor to produce work (concepts, sketches, prototypes), while the benefits (money, attribution, copyrights and patents) flow upward into the hands of a small number of high-profile professional designers at the top. There's also a power law at play, as in every industry. A few highly visible design firms and individual designers reap massive rewards, while the expanding legions of unknown firms and designers struggle to make ends meet. Of course, the "winners" in the power law game in design, as in every industry, aren't random, and it's not a true meritocracy. Instead, the design field is gendered, raced, classed, and otherwise shaped by (and shapes) broader conditions of structural inequality. The scenario that we find dramatized in *Mad Men*, in which women workers in an advertising firm are occasionally called into the office so that they can be briefly "mined" for ideas, or in which even when promoted to designer, their ideas are passed over or stolen by men, endlessly repeats.[28] In addition, the internet has enabled a new scale of extractive mechanisms in design. For example, this is often this case in "design challenges" in which dozens, sometimes hundreds, of people do free labor and submit ideas in hopes that they'll be the lucky one chosen to receive visibility, recognition, and possibly even compensation. Most recently, this process has been platformized, in spaces such as OpenIDEO, DiscoverDesign, and IdeaScale.

At its most basic, the principle of attribution simply says that design justice includes giving credit where credit is due. This principle applies across the life cycle of the design project, includes any products, and should also shape the story of the project as it is told to various audiences. In design justice, those whose lived experience guides the process are recognized as codesigners; they become co-owners of designed products, platforms, systems, and other outputs and also become coauthors of the story about the project.

Design justice considers "Who contributed?" to be a critical question for the evaluation of any given design project. Although it may not be necessary to invent new mechanisms for attribution to give credit where credit is due, there are some recent experiments in this direction. For example, J. Nathan Matias's project thanks.fm was an attempt to make it simpler for people to share credit with others on the web.[29] Although it served largely as a speculative design project and is no longer active, it helped call attention to full attribution as an (intersectional feminist) design principle. However, ultimately, attribution is not primarily a technical problem: it is a social and

cultural one. In a similar vein, Anil K. Gupta's Honey Bee Network recognizes local inventors by name.[30] Gupta founded the network in part out of his frustration at the extractive knowledge processes of many so-called development projects. Black feminist cyberscholar Kishonna Gray created the #CiteHerWork hashtag to address the theft and erasure of (especially) B/I/PoC women and femmes in academic and journalistic writing communities, including those that analyze technologies and sociotechnical practices.[31] Science and technology scholar André Brock developed *critical technocultural discourse analysis*, a mode of analysis that uses critical race, feminist, and queer theory to unpack how marginalized users often produce technocultural practices that become the core use case for digital tools and platforms, with Black Twitter as a key case study.[32] Much more work remains to be done to mainstream these and other approaches to proper attribution in design.

Equitable Distribution of Attention in Design Processes

Design justice is concerned with the equitable allocation of benefits and harms that result from any design project, and the design of new technologies often produces discursive benefits and harms. In other words, the stories that we tell about design matter. As media scholars Sarah Jackson, Moya Bailey, and Brooke Foucalt-Welles note, "Discourse constructs reality by making ideas and events meaningful in particular ways that uphold, and/or challenge cultural ideologies."[33] Scholars such as Thomas Davenport and John Beck argue that we now live in an *attention economy*,[34] where mediated visibility has become an important form of capital. Attention (time) is a scarce resource within late-stage informational capitalism, and its allocation has significant symbolic and material impacts. Design projects command attention: both social and mass media are full of stories about the latest designed objects and about the people and firms that design them. Certain individuals, organizations, and communities gain attention as designers, innovators, technological creators, or (especially in stories about technology and marginalized communities) "saviors." However, for a variety of reasons, marginalized individuals, communities, and movements rarely receive much of this attention.

Why is this the case? First, as discussed in chapter 2, paid professional design work as an elite job field is deeply unequal along race, class, and gender lines. There are fewer LGBTQI+ and/or B/I/PoC designers overall, fewer still who occupy powerful positions within design industries, and therefore fewer stories about marginalized people's design accomplishments. Additional dynamics are at play that even further distort design discourse: for example, elite networks of technology reporters and tech

industry insiders; class, race, and gender dynamics within the journalism profession, especially in tech journalism; and so on. On the other hand, there is a kind of cottage industry, or at least minor narrative, that focuses on "surprising" examples of technological design and innovation by marginalized people.[35] Without entirely dismissing this genre, it is typically quite tokenizing; these stories also often reinforce normative gender narratives about women's roles. Such stories very rarely engage in deeper conversations about *why* it should be surprising to see, say, a start-up led by an all-woman/Black/Indigenous/queer/trans* (and so on) team.

Put simply, design projects generate attention, attention is valuable, and design justice as a framework thus asks us to explore whether this attention is equitably distributed. How can design teams ensure more equitable attention distribution? Concretely, there are many possible strategies: design teams can include clauses about attribution in MOUs; take care to name community partners in press releases, reports, and all materials that describe the project; provide attribution to community partners in patents, licenses, and software-release notes; and consider how to allocate opportunities to speak about the project to journalists and other potentially interested audiences, such as policymakers, academics, and funders. Also, new kinds of attention analytics can be used to evaluate design projects within a design justice framework. Rather than focus on the raw number of news stories, quotes in prominent outlets, or social media metrics such as shares, likes, and comments, design justice practitioners might analyze stories about their projects to better understand how attention has been allocated, whose voices are heard most frequently, and whether that allocation fits the design team's goals and principles.

Resistance Is Fertile: Social Movements, Media Innovation, and Corporate Appropriation

If most design is lead user innovation within particular communities of practice, why do cultural narratives about individual genius inventors predominate? In part it's because the most visible narratives about design and innovation are well-resourced corporate mythologies. An entire industry of technology "reporting" has been built largely on press releases from established firms, start-ups, and venture capital–backed incubators. However, there are many other ways to narrate the history of technology design. One approach is to focus on the contributions of social movements.

Social movements have long been a hotbed of innovation in media tools and practices, in part because of their relationship to the media industries. As the slogan says, "Resistance is fertile!" Movements, especially when led by marginalized communities,

are systematically ignored and misrepresented in the mass media, so movement organizations often develop strong media practices, active counterpublics, and innovations in media technology out of necessity.[36] Many social movement media innovations are later adopted by the journalism profession and by the cultural industries. Indeed, this happens so frequently that political scientists William Gamson and Gadi Wolfsfeld theorize social movements and the media as interacting systems.[37]

This chapter began with the story of TXTMob and Twitter, but many similar tales could be told. Social movement design innovations include media technologies, but also decision-making processes, tactics for pressuring elites, and policy proposals, as well as cultural, artistic, and aesthetic forms. For example, the diverse, interlinked social movements in the United States in the 1960s and 1970s, including Black and brown power, feminist, antiwar, Disability, and other movements, produced and influenced a wide range of cultural innovation in fields like music, painting, film, dance, and more. Media historian Fred Turner has argued that 1960s movement counterculture led to broader social transformations and to the development of the internet.[38] Many movement-led innovations from this time period provided fodder for the reinvigoration of mainstream cultural industries. In the late 1990s and early 2000s, media innovations by the global justice movement played a similar role in seeding ideas, demo designs, and proofs of concept for participatory media making that would later become the core of "culture industries 2.0." Soon, as media scholar Tiziana Terranova put it, nearly everyone would be performing "free labor for the digital economy."[39]

The Misrepresentation of Social Movements in the Mass Media

In part, social movements are important spaces for media innovation because activists are so badly misrepresented by the mass media system. Empirical studies of mass media coverage of social movements bears out activists' lived experience: print and TV news provide little sustained coverage of social movements, and when they do, rarely adopt movement framing.[40] In particular, mass media tend to cover protests using violent conflict frames.[41] This downplays the arguments and legitimate grievances of protesters in favor of spectacular imagery and language about violent conflict between protesters and police. Even as protest policing has become increasingly militarized,[42] mass media have begun to embed reporters with police; this results in coverage that is systematically biased toward the perspectives of law enforcement. In the wake of the failure of US military and information policy in Vietnam, the US government developed more sophisticated practices of information shaping and control to avoid losing "the

media war" during future imperial adventures. Many of these tactics were deployed and honed during Gulf War I, in which information control played such an important role that philosopher and media theorist Jean Baudrillard famously described the war as a *simulation*.[43] The practice of "embedding" reporters with US military units in Iraq and Afghanistan, widely discussed in the 2003 invasion of Iraq,[44] was subsequently deployed during domestic protest policing in the United States.[45] For example, since 2003, mainstream media outlets have embedded reporters with police units during most large-scale protests, including the 2003 mobilizations against the Free Trade Area of the Americas in Miami; the 2008 protests at the Republican National Convention in St. Paul/Minneapolis; the Democratic National Convention in Denver; the 2014 protests in Ferguson, Missouri;[46] and many other large-scale protests since.

The Revolution Will Be Livestreamed

Under conditions of scarce and poorly framed coverage from powerful media organizations, social movements have always taken it upon themselves to self-represent. Indeed, the history of the early print press is in large part a history of social movements, political parties, and ethnic groups each producing their own newspapers.[47] To take a more recent example, the last decade has seen widespread adoption of livestreaming. From early on, livestreaming tools were appropriated by social movement actors, who also often innovated new approaches to the way the technology was used. Activists freely shared these innovations through social movement networks, and some of these innovations were then incorporated into new iterations of livestreaming platforms, products, and tools. Examples of livestreaming by social movements include the antinuclear movement, livestreamed by Deep Dish TV (via satellite, in the 1980s);[48] the Global Justice Movement, livestreamed by Indymedia during the early 2000s (via DIY servers); the immigrant rights movement, which used Ustream and livestream.com to transmit sit-ins from five congressional offices in July 2010 (the first time this had ever been done);[49] Occupy Wall Street (streamed by Global Rev and others);[50] the Brazilian antiausterity mobilizations, streamed by Midia Ninja;[51] and the many livestreamers within #BlackLivesMatter and other more recent movements.[52] In the earlier examples, activists organized their own livestreaming infrastructure with handheld cameras, Linux laptops, and free/libre software (usually ICEcast and/or VideoLAN) and maintained their own streaming servers. Later, most switched to commercial livestreaming video services such as Bambuser, then Meerkat and Periscope, then Twitter and Facebook Live, then Instagram Live and Twitch.[53]

Radical Technology Collectives: Autistici/Inventati, RiseUp, May First/People Link, and Beyond

Although much social movement ICT innovation happens “organically” around the edges, as activists cobble together whatever they need, there is also a long history of dedicated tech activists who organize radical tech collectives (RTCs) to support movement organizations more systematically. Recently, the Italian RTC Autistici/Inventati (A/I) published an English translation of its history, composed of interviews with collective members and contextual notes. This book provides a detailed and fascinating history of Italian hacker and media activist projects and collectives, the ways that they were linked to social movement organizations, their constant evolution, fragmentation, recombination, and adaption to the changes in networked communication technology from BBS systems to the web, their integration of GNU/Linux and free software, the role that they played in developing and promoting encryption among social movement groups, and much more.

In the preface, media activist and theorist Maxigas describes the dynamics of politicized hacker culture. In Europe, he notes that there are three overlapping but distinct circuits, or scenes, of political hackers; one in Northern and Western Europe, more focused on technical innovation; another in Eastern Europe and the Baltic states, centered on the demoscene (parties where people share prototypes and demonstrations that push the limits of computers as audiovisual tools); and a third in Southern Europe and the Iberian peninsula, organized around hackerspaces in squats and social centers and most closely linked with active extra-parliamentary left social movements. These RTCs all focus on providing infrastructure for activists: primarily email, web hosting, and chat servers. They are typically locally oriented and support activist individuals, groups, and networks in a particular city or country. He describes them as follows: “Radical technology collectives build political solidarity and nurture security behaviors within and between activist groups in addition to providing things like email and putting the right cryptographic algorithms in place.”[54]

In addition, Maxigas notes that one of the most crucial functions of RTCs is maintenance and repair of movement infrastructures: “Even though the actual everyday practice of hacktivism is mostly about maintenance, groups that run infrastructure have received little to zero attention so far. This is especially ironic because even the emblematic movement of contemporary hacktivism (Anonymous) could not operate without relying on the services of radical server collectives. While it is the spectacular acts of disruption that go down in history, the daily labor of

infrastructure maintenance makes history to a comparable degree. Therefore, it is necessary to rethink the history of technological resistance from a use-centric point of view in order to counterbalance innovation-centric narratives."[55] ICT maintenance and repair activities are rarely discussed in accounts of activist technology because of the mythology of innovation and the constant bias toward the "new," even though these activities are just as important to activist goals.[56]

Ultimately, A/I played a key role in bringing Italian activism online. The collective connected thousands of activists from a wide range of political backgrounds with their first email accounts, mailing lists, and websites. In the book, A/I members describe how they showed up everywhere: at protests, at fairs, at squats, and at meetings, convincing activists who at the time saw computers as something that were only used in the workplace or by the state that there was value in adopting these new tools for organizing and communications. A/I also maintained, supported, and repaired movement ICT infrastructure over more than a decade while serving as an important informal educational network for an entire generation of tech activists.[57]

RTCs have played similar key roles in nearly every region of the world over the past two decades. For example, in North America, RiseUp and May First/People Link perform the same kind of work as A/I for literally thousands of movement organizations.[58] It was from this social movement context that Open Whisper Systems, led by hackers from RiseUp, developed Signal secure messenger. This provides yet another example of technology design led by RTCs, deeply embedded in social movements, that then becomes industry standard: Open Whisper System's end-to-end encrypted messaging protocol was adopted in 2016 by WhatsApp, the largest messaging app in the world, with over 1.5 billion users.[59]

Design Scoping and Framing

One of the most powerful, and least discussed, ways that narratives structure design processes and outcomes is in the scoping stage: How do we frame the "problem?" Indeed, problem definition is a key component of all design processes. Herbert Simon, sociologist, economist, and author of *The Sciences of the Artificial*, argues that design always involves the recognition of assumptions and the redefinition of the design problem.[60] Yet much of the time, powerful institutions frame problems for designers to solve in ways that systematically invisibilize structural inequality, history, and community strategies of innovation, resilience, and organized resistance. In this section, I provide a critical reading of the design scoping process and highlight

alternative approaches. I argue both for a shift from deficit- to asset-based approaches to design scoping, and for the formal inclusion of community members in design processes during the scoping or "defining our challenge" phase of a design cycle, not only during the "gathering ideas" or "testing our solutions" phases.

Scoping is ongoing, iterative, and fundamental to design work. It is sometimes thought of as a task to be completed before the "real work" of design can begin. However, design can also be seen as an iterative process of "changing the problem to find the solution." In his classic text on reflective practice, philosopher and urban planning professor Donald Schön notes that *problem framing* is one of the fundamental elements of design.[61] Schön grounds this idea in the work of philosopher, psychologist, and educational theorist John Dewey. In his theory of joint inquiry, Dewey argues that because knowledge is *particular* and *contingent*, rather than *universal* or *necessary*, "people jointly explore, discuss, and define a problem and jointly explore, develop, and evaluate possible solutions."[62] The way that a problem is conceived and framed has real implications for the range of possible solutions. Thus, for Dewey, determining the scope of a project is always a critical ethical decision.

In a related vein, designers and engineers Robert Hoffman, Axel Roesler, and Brian Moon note that many people believe that designers work systematically, in a top-down approach that starts with goals, requirements, and constraints, then moves toward solutions. However, they argue that research on how expert designers actually work shows that regular deviation from such a linear process is the norm.[63] Design proceeds through the alternating recognition and relaxation of assumptions, moving through iteration toward a "satisficing" solution: "The designer decides what constraints to relax in order to respond to the most important ones. The design concept that emerges from this process of sacrificing secondary properties is a satisficing design solution, not necessarily an optimal one, as is generally approached by engineering optimization. The satisficing solution is a necessity when trying to address a complex design problem with so many parameters that optimization approaches would not be feasible."[64] This view of a design process as ongoing problem iteration, concurrent with consideration of possible solutions, is shared by cognitive psychologists Linda Willis and Janet Kolodner, who refer to *design problem evolution* as the way that a designer "grapples with contradictions, ambiguities, and specification roadblocks and repeatedly reformulates the problem at hand."[65] Scoping is therefore an ongoing and key aspect of any design process. Unfortunately, under white supremacist capitalist heteropatriarchy and settler colonialism, scoping also

often is used as an excuse to ignore, bracket, or sideline questions of structural, historical, institutional, and/or systemic inequality.

As noted HCI scholar Paul Dourish remarks, design often functions as an *antipolitics machine*, to use anthropologist James Ferguson's term for the depoliticizing effects of international development discourse:

> Development systematically forecloses an examination of the political contexts within which the development engagement takes place—the reasons for income disparity, the conditions of inward investment, the nature of democratic processes, the history of colonial relations, the effects of globalization, etc. Ferguson argues that the effectiveness of development projects are fundamentally constrained by the fact that the development discourse does not allow one to examine the conditions under which it arises. A similar argument could be made about design discourse, in which commitments to technological determinism and technosocial progress leave little room for the political and historical.[66]

Later in this chapter, we will explore several examples of how design discourse functions as an antipolitics machine in practice.

Ninety-Nine Problems, but We Frame Just One

In their 2016 book *Grassroots Innovation Movements*, STS scholars Adrian Smith, Mariano Fressoli, Dinesh Abrol, Elisa Arond, and Adrian Ely note that the concept of framing is used differently in social movement studies and in the sociology of technology.[67] For social movement scholars Robert Benford and David Snow, collective action frames are "sets of belief and meanings that inspire and legitimate the activities and campaigns of a social movement organization."[68] The creation and circulation of new frames is an important social movement activity, since frames enable and constrain action and shape the emergence of social movement identities. In science and technology studies, however, "technological frames consist of the shared problems, strategies, requirements, theories, knowledge, design criteria, exemplary artefacts, testing procedures and user practices that emerge through social interaction in groups. They help us to understand what social actors deem to be reasonable in choosing and developing a technology."[69] How, then, do problem frames depoliticize design processes?

For one, by decoupling "design problems" from structure, from history, and from consideration of systemic, persistent, ongoing forms of oppression under the matrix of

domination. For example, the ways that algorithms are used by various actors and institutions to reproduce white supremacist capitalist heteropatriarchy and settler colonialism is reduced to a critique of "algorithmic bias." The ways that the media system symbolically annihilates most communities and forms of human experience while it produces neoliberal hetero- and cis-normative subjectivities; promotes anti-Blackness; and normalizes the logics of the prison industrial complex, settler colonialism, and empire are reduced to questions about representational equity according to a limited group of identity categories.

The organization of an entire arena of human endeavor—the design of new technologies—according to the logic of the matrix of domination, whereby designers, imagined users, values, affordances, ownership, governance, and other aspects of design are all set up to systematically reproduce white supremacist capitalist heteropatriarchy, both in process and outcome, is reduced to critiques of a few "quirky" examples of gender or racial bias: "Isn't it so messed up that digital camera algorithms thought Asian people had their eyes closed when the picture was taken? Whoever wrote that program is really racist!" Thus, the constant and pervasive reproduction of structural inequality across every field of life, including the design of digital tools, platforms, and systems, is reduced to individualized racist acts or, more typically, instances of unconscious bias.

This framing produces a particular set of conversations and actions. It allows technocentricity and solutionism to carry the day. If what we're up against is a particular software development team that made some bad decisions, then all we need to do is work to reengineer the software and smooth out biases that were accidentally coded in. Of course, code and UI bias reviews; algorithmic bias audits; antiracism workshops; gender parity targets for hiring, retention, and salaries; and increased awareness of microaggressions are all important and worthwhile pursuits. At the same time, if we never zoom out to the big picture, then we never take on the larger structures that constantly militate toward the reproduction of designed inequality. Instead, we are left to constantly put out tiny brush fires on our doorstep while the entire forest around us is consumed by a massive blaze. We remain forever stuck gathering donations of bottled drinking water for children in Flint, Michigan, without ever organizing to force the state to replace the contaminated water source and pipes throughout the entire system.[70] For these reasons, design justice as a framework impels us to reconsider the scoping process.

Problems with Problem Scoping: *The 18F Guide to Lean Product Design*

For example, consider *The 18F Guide to Lean Product Design* (18F is a federal office tasked with supporting other government agencies to build and improve tech products and services). In describing its design process, 18F notes: "The first stage of any project is to do research to discover problems that need solving. Your goal is three-fold: Identify and more deeply understand the challenge facing the organization and its stakeholders; Identify the people you believe could be most helped by your solution; and, Explore the problem, context, behaviors, and motivations of the people (your intended users)."[71] The guide then provides the following example:

> 1. The challenge: the United States has high unemployment rate and the growth in jobs is for highly skilled workers. We need more citizens who can meet that demand, and we have evidence that college educated workers are more employed and more employable.
> 2. The people: High school graduates and adults without a degree.
> 3. The problem: Prospective college students lack information about the potential economic outcomes of a college degree, and also lack information that would lead them to be able to select which college is right for them.[72]

Design justice provides us with tools to critically analyze this problem statement. Recall that design justice centers analysis of how design affects the unequal distribution of benefits and burdens to groups of people at different locations within the matrix of domination.

The problem statement offered by 18F immediately skips over any discussion of structural inequality. For example: How is the unemployment rate distributed among different groups of people in the United States? How is college education distributed? What groups of people are getting access to those jobs that are growing, and what groups are being left out? In a design justice approach, the answers to these kinds of questions inform both the "people" and "problem" statements. Exploring these questions also modifies the assumptions undergirding the problem statement. The writers of this example universalize unemployment and access to college education across an unspecified "citizen," although both unemployment and college access in the United States are deeply structured by race, class, gender, disability, and immigration status: in other words, by location within the matrix of domination. The problem is framed as a *lack of information* about the utility of a college degree, rather than as any one of several alternative formulations that recognize intersectional structural inequality.

Recognition of racially disparate access to college would produce a different problem framing. For example, high schools that predominantly serve students of color often do not receive the resources they need to successfully prepare students for college; heavy policing inside schools and racially disparate application of disciplinary rules have led to a school-to-prison pipeline for low-income students of color; spiraling college costs have made higher education increasingly unattainable for poor and working-class students; and so on. The challenge, people, and problem, reframed through a design justice lens, shape a very different kind of design project—and a different allocation of resources, time, and energy.

Design Challenges: Full of Crap? Notes on the Gates Foundation's Reinvent the Toilet Challenge

Design challenges are a frequent, highly visible, and narrative-centric approach to design.[73] In 2011, the Gates Foundation launched a design challenge to develop a new kind of toilet. The rationale was as follows: "The Water, Sanitation & Hygiene program initiated the Reinvent the Toilet Challenge to bring sustainable sanitation solutions to the 2.5 billion people worldwide who don't have access to safe, affordable sanitation. Grants have been awarded to sixteen researchers around the world who are using innovative approaches—based on fundamental engineering processes—for the safe and sustainable management of human waste."[74]

Figure 3.3 "Loughborough University has developed a user-friendly, fully operational household toilet system that transforms feces into biochar through the hydrothermal carbonization of fecal sludge." *Source:* Gates Foundation, n.d.

The goal of the challenge was to create a toilet that "removes germs from human waste and recovers valuable resources such as energy, clean water, and nutrients; Operates 'off the grid' without connections to water, sewer, or electrical lines; Costs less than US$.05 cents per user per day; Promotes sustainable and financially profitable sanitation services and businesses that operate in poor, urban settings; [and] Is a truly aspirational next-generation product that everyone will want to use—in developed as well as developing nations."[75] Between 2011 and 2018, the Gates Foundation invested more than $200 million USD in the Reinvent the Toilet Challenge and related toilet R&D.[76] Projects each received up to $100,000. Prototypes used high heat to convert feces into biochar, boiled black water to extract pure water, and added chemical agents to break down waste, among other technologies. In 2013, the foundation announced $5 million for Chinese researchers; in 2014, announced another $2 million for Indian researchers; and in 2018, held a Reinvented Toilet Expo in Beijing, where it announced a commitment of up to $200 million more, as well as $2.5 billion (billion, with a b, not a typo) in financing from the World Bank, Asian Development Bank, and African Development Bank. The challenge framing implied that the key problem is the failure of developing country cities to provide sewage

infrastructure, combined with additional problems such as women's fear of using public toilet facilities in contexts in which they might be attacked by men.

However, sanitation experts working in developing countries argued that "the communities that desperately need sanitation will be unable to afford the advanced technology the initiative promotes."[77] For example, unrelated to (and ineligible for) the Gates Foundation's challenge, Toilets for People, a for-profit business focused on developing affordable toilets for developing countries, designed a low-tech waterless composting toilet with a cost below $200. A Swedish firm called Peepoople designed a biodegradable bag that kills pathogens.[78] Sasha Kramer, cofounder of an NGO that focuses on sanitation in Haiti, put it this way: "Building the toilet is the easy part. The most challenging step is making it work on the ground. The true challenge is not technology, it's really an issue of access, social mobilization, and ongoing maintenance of the toilet."[79]

Meanwhile, very low-cost alternatives to sewage infrastructure and large centralized treatment plants already exist and have been effectively integrated into daily life in a wide range of locations for decades (and in some cases millennia). A quick scan of DIY black- and greywater treatment technology on appropedia.org provides detailed descriptions of more than a dozen treatment approaches that can be built easily by individuals, families, or communities using locally available materials, at costs affordable to nearly all people on the planet.[80] For example, one of the most common and affordable solutions is a bucket toilet compost system. In essence, human waste is deposited in a bucket, then covered with a few scoops of ash, sawdust, or wood chips. When partly full, the bucket is then emptied into a compost bin. The compost bin must be regularly rotated. Within one year, the waste is converted to useful soil, which is safe to use for agricultural purposes. Larger-scale versions of this system are widely deployed. In China, a typical village refuse management system involves large cement tanks in which human waste is composted, later to be reused for agriculture.

My point here is not to argue that new, innovative toilet technology is not desirable, that it is not possible, or even that the Gates Foundation grants to the toilet innovation teams were a waste (pun intended!). Instead, I present the Reinvent the Toilet Challenge for analysis through a design justice lens: What story is told? How is the problem framed? Who decides the scope? What values are built in to the designed objects and processes? Who benefits? Who loses?

To begin, the challenge ignored existing, low-cost, appropriate technology solutions to the "problem." Although tried and true, and arguably likely to be the most effective, these solutions were not mentioned in the challenge language, were not funded as recipients of challenge grants, and their uptake was not advanced at all by the billions of dollars linked to the Reinvent the Toilet Challenge. Jason Kass, in a well-argued *New York Times* op-ed, put it this way: "The trouble is that the Gates Foundation has treated the quest to find the proper solution as it would a cutting-edge project at Microsoft: lots of bells and whistles, sky-high budgets and engineers in elite institutions experimenting with the newest technologies, thousands of miles away from their clients."[81] This is not to say that existing systems are perfect, problem-free, or universally applicable. Sawdust requires cutting down trees, ash requires burning things and producing potentially harmful emissions, compost requires physical space for a composting unit, and so on. However, the complete lack of investment in thinking about how to improve already-existing solutions might reasonably be described as a grand failure. This failure is produced by a techno-solutionist orientation (new technology will save us!), an exclusionary and elitist understanding of what technology is and where it comes from (smart scientists in university and corporate laboratories), and a lack of interest in preexisting, community-based design practices.

Urvashi Prasad, writing about the Gates competition in 2012, notes that "we can't get distracted by the relative glamour of a technical design competition. Sadly, no perfect toilet for the poor will get us where we need to be. We also need an arsenal of non-technical strategies."[82] Prasad goes on to argue for optimization of solutions that already work, including community ownership of existing infrastructure and toilet blocks, enforceable contracts with private toilet operators, and flexible payment options for urban slum dwellers, such as monthly passes. They also note that in places where toilets are not in regular use, there is a wide range of reasons that people might buy in (or not) to their importance. For example, people may adopt toilet use as a sign of social status, for protection of female family members from having to engage in late night trips to communal toilets, and so on. Prasad also highlights the importance of contextualized design: "Not even the best designed toilet technology will fit every situation. For instance, even in a well-established slum that has access to both water and sewage pipelines, individual homes may be extremely space constrained. Where exactly do you fit a new toilet in a 12 square metre—or 129 square foot—home that is sandwiched between three other equally compact homes?"[83] Ultimately, Prasad argues that uptake, use, and maintenance of existing solutions, as well as understanding real-world barriers and motivations, are the true keys to success. For example, they

describe how the Slum Networking Project in Ahmedabad found that slum dwellers who decided that toilets were important to their community were willing to invest several times what the government contributed to maintain and upgrade sanitation infrastructure. Prasad urges that "those of us working to promote universal access to clean water and sanitation must keep our eyes not just on the competition and prizes, but on the less glamorous work of encouraging adoption, usage, and maintenance."[84] They also argue that existing public and private toilets make up about 50 percent of sanitation infrastructure in Indian urban slums, but many of them are poorly maintained. Figuring out how to promote ongoing maintenance, then, is the key challenge, rather than new toilet design. This is remarkably similar to Maxigas's argument for the important infrastructural and maintenance work of radical technology collectives, described earlier in this chapter.

Again, the point here is not that new technologies are useless, that design challenges are a waste of time, or that existing solutions are always sufficient. Instead, it is to recognize that wherever there are problems, those most affected have nearly always already developed solutions; that existing solutions that come from those most affected are likely to have the advantage of being based on local materials, skills, and infrastructure; that people who are from, and work directly with, the most affected communities should be included in and control design processes that are meant to benefit them; that sometimes (although not always) external resources can best be used to support, improve, scale, and/or reduce the costs of existing, locally created solutions; that barriers are often not about a particular tool or object, but are social, cultural, and economic in nature.

The Gates Challenge assumes the opposite of most of these points, at least in public discourse and in grantmaking: it ignores existing solutions; assumes that solutions will come from university labs far from the social realities of those without access to sanitation; makes no stipulation for, or even suggestion of, a codesign approach that would include local expertise and/or tacit and experiential knowledge; and makes no mention of adoption, usage, or maintenance.

The Loughborough University recipients of one of the Gates grants produced a very interesting article about their design process. According to them, design unfolded in phases, beginning with user research involving "multidisciplinary teams of experts" to gather requirements and focus groups with "primary users and secondary users," although they do not indicate whether the focus groups were actually conducted with Indian slum dwellers who lack access to toilets.[85] The team developed functional

requirements, and the project hired an undergraduate student in the industrial design program to design a toilet seat. Next, the researchers and undergraduates took a field trip to India to meet with local toilet providers, aid agencies, and experts. Upon returning from the field trip, they created prototypes using blue foam and tested them with students and faculty from the design school. One of the key findings of the research phase was that "the product should be designed with local manufacture in mind, as this could be beneficial on a number of counts, from sustainability and cost through to ownership, maintenance, and repair."[86] I argue that this finding is generalizable to most design processes and should in fact be a starting point, rather than a conclusion.

The team also shares this fascinating finding: "Contrary to some popular beliefs in the West, a notable proportion of users (certainly in a domestic context) in Ahmedabad at least aspire to own a sit type toilet, despite the documented health benefits of squat toilets."[87] This presents a difficult moment for a design justice approach. If people everywhere aspire to own sit toilets, despite the health benefits of squat toilets, because their hegemonic presence in mass media and in the homes of local elites makes them a marker of economic success, what is the appropriate path? On the one hand, resources might be reallocated from product design to popular education and/or media campaigns about the benefits of squat toilets over sit toilets. On the other hand, design justice urges us to respect and support communities in making their own decisions. This is a perhaps unresolvable tension.

In any case, the Loughborough University team's integration of a biochar system seems to have happened entirely outside the user-facing design process: there was no prototyping process that involved real-world users (industrial design students created and tested foam prototypes after their short field trip), and the finished product was presented at the fair without ever having been tested in real-world conditions by real-world users. The paper ends with this statement: "Extensive user testing in the field will no doubt highlight issues that still need to be addressed, as well as possible flaws in the initial design."[88] No doubt.

In one of the most insightful articles about the challenge, Lloyd Alter writes that the winning projects are all expensive, complicated, and difficult to maintain.[89] They also require more household space than most intended users possess. Some are potentially deadly: several superheat feces, while others, like the California Institute of Technology (Caltech) winning entry, produce deadly chlorine gas. Alter also writes about the wasted water and energy involved in all flush toilet systems. Most

interesting is his discussion of the history of humanure: “The fact is, you don’t need high tech to deal with poop and pee, you need a social organization like they had in China and Japan before the development of artificial fertilizer. There was an entire economic infrastructure, like the boats and canals shown above in Shanghai, for picking the stuff up, processing and storing it to kill microorganisms, and using it as fertilizer. It was valuable stuff.” He goes on to cite Kris De Decker’s writing about the trade in human manure at the turn of the century, when the concession to manage collection, processing, and distribution from the city to the countryside was worth hundreds of thousands of dollars: “In 1908, a Chinese business man paid the city [the equivalent of $700,000] to obtain the right to remove 78,000 tonnes of humanure per year from a region of the city to sell it to the farmers in the countryside.”[90] Humanure, historically, was a valuable commodity and an input to sustainable farming practices. Now replaced by imported fertilizers and phosphorous, it has been reframed as waste, and municipalities spend vast sums of money annually to literally throw away a potential source of income. Seen in the light of this history, the Gates Challenge might do better to invest in new businesses that purchase (or collect at no cost) humanure from slum dwellers for processing into fertilizer for sale to farmers, whether in urban farming or after transport to the countryside.

Finally, to highlight another one of the ways that the design narrative invisibilizes the matrix of domination, much writing in this field notes that people in India don’t want to send their daughters to shared toilets because they fear they will be harassed.[91] If sexual harassment is one of the primary barriers to sanitation access, then it should follow that people interested in improving access to sanitation should invest in eradicating sexual harassment. However, this simple insight is entirely absent from the framing, scoping, prize eligibility, publicity, and the rest of the institutional narrative around the Reinvent the Toilet Challenge. It might make sense to perform a cost/benefit analysis of what it would take to eliminate (or drastically reduce) sexual harassment of women and girls during public toilet use versus what it would take to install functioning toilets in each household in India.

The boundaries of any given design narrative, such as in a design challenge, typically constrain the possibilities of addressing systemic issues, root causes, or approaches based on social organization. In the Reinvent the Toilet Challenge, low-cost existing technologies, business models that value humanure as a main input to fertilizer, and the need to eliminate or drastically reduce sexual violence against women and girls who attempt to use shared sanitation facilities are all off the table. This is true even though any one of these three approaches is potentially more likely than a new toilet

design to achieve the stated goal of significantly reducing the proportion of the world's population that lacks access to clean water and sanitation.

Of course, new technologies are exciting and sometimes do bring significant improvements to quality of life and human capabilities, and any given design initiative hopes to maximize impact by tightly focusing on a particular aspect of a broader puzzle. That said, design challenges constructed with little to no input from the most affected people, that assume that solutions will come from university experts thousands of miles away, that ignore existing solutions, and that systematically avoid the root causes of identified problems are not grounded in design justice, and ultimately they are likely to fail in both practical and ethical terms.

Happily, there are a growing number of people, organizations, and networks that recognize these points and are working directly with communities with lived experience of design challenge areas to frame, scope, prototype, and do design work together. This is taking place in design narrative workshops in the Design Justice Network, in spaces like the Make the Breast Pump Not Suck Hackathon and Policy Summit,[92] MigraHack,[93] and Trans*H4CK,[94] and elsewhere throughout multiple design fields. In chapter 4, we will dive more deeply into the question of how to organize hackathons, DiscoTechs, and other spaces for technology design in ways that challenge, rather than reproduce, the matrix of domination.

Design Narratives: Conclusions

Stories have power. The "official" Twitter origin story holds that one of the founders had a brilliant blue-sky flash of genius. Developers who were part of the process have a counternarrative: anarchist hacker-activists created TXTmob as a tool to help affinity groups stay one move ahead of the cops in the NYC Republican National Convention protests of 2004, and TXTmob served as demo design for the Odeo hackday that led to Twitter. The key point is that the stories we tell about the design of new technologies both reflect our broader understanding of the world and shape the horizon of the possible.

Design generates attention, and attention is an increasingly scarce resource that is not equitably allocated. The amount of attention we can command is shaped, in part, by our location within the matrix of domination (white supremacy, heteropatriarchy, capitalism, and settler colonialism). A design justice approach requires proper attribution for too-often-erased participants in design processes.

Innovation in media technology, like all technological innovation, is an interplay among complex sets of actors including users, developers, firms, universities, the state, and others, not a top-down process led by solitary programmer "rock stars." Lead users develop many, if not most, innovations in any given field, through DIY and informal processes outside of "official" research, design, and development channels. This has implications for the way we think and talk about design, as well as policy implications. Social movements in particular have always been a hotbed of innovation in media tools and practices, in part because of the relationship between the media industries and social movement (mis)representation. Social movements, especially when led by marginalized communities, are systematically ignored and misrepresented in the mass media, so they often form strong community media practices, create active counterpublics, and develop media innovations out of necessity.[95] Social movements thus can be important sites of technology design, diffusion, adoption, and support. Many social movement media innovations are later adopted by the journalism profession and by the broader cultural industries, although stripped of their original counterhegemonic intent. Examples include TXTMob and Twitter, Signal and WhatsApp, and many more. We have to tell these stories so that social movement contributions to the history of design are not erased.

Finally, one of the most important ways that narratives structure design is in the scoping and framing of design problems. Design scoping processes that exclude structural problems, large institutional actors, or the state from the field of analysis convert design into an antipolitics machine. Design narratives too frequently invisibilize the matrix of domination and set the boundaries of the imagination to exclude already existing, community-led solutions, as in the Gates Foundation's Reinvent the Toilet Challenge.

Design justice provides a lens that we can use to analyze design narratives. In other words, what stories are told about design problems, solutions, contexts, and outcomes? Who gets to tell these stories? Who participates, who benefits, and who is harmed?

Design justice considers a dual pragmatic/utopic approach that simultaneously offers concrete suggestions for immediate implementation to improve people's quality of life while also calling out power inequalities and larger structural forces that impact people's life chances in the long run. Design justice also approaches scoping and framing through a community asset lens, and recognizes that communities that are marginalized under the matrix of domination nearly always have already developed strategies and tools to navigate their problems, as well as rich repertoires of

sociotechnical practices to support cultural, political, and economic life. Design justice is interested in telling stories that amplify, lift up, and make visible existing community-based design solutions, practices, and practitioners.

Footnotes

1. ElBaradei 2003 ↩
2. Crawford 2017a. ↩
3. Crawford 2017b; Burckle 2013. ↩
4. Dyer-Witheford 1999. ↩
5. Tarrow 2010; Walgrave and Rucht 2010. ↩
6. Furness 2007. ↩
7. New York Civil Liberties Union 2014. ↩
8. See http://wearemany.com. ↩
9. Jackson, Bailey, and Foucault Welles 2019. ↩
10. In fact, Hirsch worked at the Center for Civic Media, the same research group that I would become affiliated with as an MIT faculty member years later in 2012. ↩
11. Hirsch 2008. ↩
12. Hirsch 2013. ↩
13. Sifry 2012. ↩
14. Hirsch 2013. ↩
15. Hirsch 2013. ↩
16. Dyer, Gregersen, and Christensen 2011. ↩
17. Kelley and Littman 2001. ↩
18. For example, see Carey 1983 and Starr 2004. ↩
19. *Meritocracy* was originally a satirical term, as Robert Frank (2016) argues in *Success and Luck: Good Fortune and the Myth of Meritocracy*. ↩

20. Kwate and Meyer 2010, writing in reference to the 1968 edition of sociologist Robert Merton's book Social Theory and Social Structure. Here Kwate and Meyer draw from a chapter titled “Continuities in the Theory of Social Structure and Anomie.” That chapter, in particular starting on page 221 in a passage titled 'the success theme in American culture,' is an extended discussion of the ways that structural inequality deeply shapes possibilities for success in the United States, despite widely held cultural ideas that financial success is possible for anyone who works hard. ↩
21. Rhode 1991. ↩
22. Rogers 1962. ↩
23. Bar, Weber, and Pisani 2016. ↩
24. Bar, Weber, and Pisani 2016. ↩
25. Von Hippel 2005. ↩
26. Von Hippel 2005, 76. ↩
27. See *The Eureka Myth* by Jessica Silbey (2014), who disentangles the relationships among creativity, innovation, and patent and copyright law. ↩
28. Ferrucci, Shoenberger, and Schauster 2014. ↩
29. Matias 2012. ↩
30. Gupta 2006. ↩
31. Gray 2015. ↩
32. Brock 2018. ↩
33. Jackson, Bailey, and Foucalt Welles 2019, 12. ↩
34. Davenport and Beck 2001. ↩
35. For example, see https://en.wikipedia.org/wiki/Kelvin_Doe. ↩
36. Downing 2000; Rodriguez 2001; and Milan 2013. ↩
37. Gamson and Wolfsfeld 1993. ↩

38. Turner 2010. ↩
39. Terranova 2000. ↩
40. See the excellent literature review on this topic in Santa Ana, López, and Munguía 2010. ↩
41. Cottle 2008. ↩
42. Wood 2014; Della Porta and Reiter 1998. ↩
43. Baudrillard 1995. ↩
44. Kellner 2004. ↩
45. Klein 2003. ↩
46. Kumanyika 2016. ↩
47. González and Torres 2011. ↩
48. Halleck 2002. ↩
49. Costanza-Chock 2011. ↩
50. Costanza-Chock 2012. ↩
51. See midianinja.org. ↩
52. Blevins 2018; Jackson, Bailey, and Foucalt Welles 2019. ↩
53. Taylor 2018. ↩
54. Maxigas in AUTISTICI/INVENTATI 2017, 12. ↩
55. Maxigas in AUTISTICI/INVENTATI 2017, 12. ↩
56. Maxigas in AUTISTICI/INVENTATI 2017, 12. ↩
57. AUTISTICI/INVENTATI 2017. ↩
58. Lopez et al. 2007; Wolfson 2014; and Coleman 2011. ↩
59. Metz 2016. ↩
60. Simon 1996. ↩

61. Schön 1983. ↩
62. Steen 2013, 6. ↩
63. Hoffman, Roessler and Moon 2004. ↩
64. Alexander, cited in Hoffman, Roessler and Moon 2004. ↩
65. Hoffman, Roessler and Moon 2004. ↩
66. Dourish 2010. ↩
67. Smith et al 2016. ↩
68. Benford and Snow 2000, 614. ↩
69. Smith et al. 2016, 23. ↩
70. Hanna-Attisha et al. 2016; Butler, Scammell, and Benson 2016. ↩
71. See 18F's guide at https://lean-product-design.18f.gov/1-discovery-research. ↩
72. See https://lean-product-design.18f.gov/1-discovery-research. ↩
73. Brown 2009. ↩
74. Gates Foundation, n.d. ↩
75. Gates Foundation, n.d. ↩
76. *Economist* online 2012; and see https://www.gatesfoundation.org/Media-Center/Press-Releases/2018/11/Bill-Gates-Launches-Reinvented-Toilet-Expo-Showcasing-New-Pathogen-Killing-Sanitation-Products. ↩
77. Kennedy 2013. ↩
78. Kennedy 2013. ↩
79. Kramer, quoted in Kennedy 2013. ↩
80. See https://www.appropedia.org. ↩
81. Kass 2013. ↩
82. Prasad 2012. ↩

83. Prasad 2012. ↩

84. Prasad 2012. ↩

85. Hurn, Gyi, and Mackareth 2014. ↩

86. Hurn, Gyi, and Mackareth 2014, 7. ↩

87. Hurn, Gyi, and Mackareth 2014, 7. ↩

88. Hurn, Gyi, and Mackareth 2014, 8. ↩

89. Alter 2012. ↩

90. De Decker's exhaustively researched article details the history of human dung removal systems in relationship to agriculture and food systems. In it, De Decker describes the system of human feces and urine removal that operated effectively for about four thousand years in China, where sealed containers were removed from households all over the country and transported to farmlands, at which point they were composted and used as fertilizer. See De Decker 2010. ↩

91. Tong 2017. ↩

92. See https://www.makethebreastpumpnotsuck.com. ↩

93. Hare 2013. ↩

94. See http://www.transhack.org. ↩

95. Downing 2000. ↩