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Introduction

> Why did this come up as an issue when it did? Well . . . People started tracking instances of overt sexism and talking about it. The default [had been], sigh, "another one of those [bad] things happened to me." Then there were the "groping is happening at your events" [discussions], sometimes people were blogging about this . . . Women who had been in the community long enough got to the point [where] they said, it's ok to have this conversation [now]. It's critical that at entry-level stuff you—*we*—don't fuck this stuff up [because then we will turn people off and lose them forever].[1]
>
> —INTERVIEWEE, MARCH 2012

A reader might reasonably assume that the opening quote refers to recent revelations of sexual harassment (and worse) in Hollywood. Starting in the fall of 2017, a series of accusations were leveled against prominent men in the entertainment industry, starting with film producer Harvey Weinstein. This sparked a wave of "#MeToo" public sphere discussions of harassment, misconduct, and unequal treatment of women that circulated in the media, around water coolers, on social media platforms, and in schools and homes.[2]

1. Interview, Meg, March 2012, Boston, MA.

2. Initially conceived by civil rights activist Tarana Burke in 2006, "#MeToo" drew women's individual experiences with sexual harassment into collectivity, creating space for empathy, solidarity, and activism. In the wake of Trump's election to the presidency, there was renewed urgency for attention to these issues. See Gibson et al. 2019; Ohlheiser 2017.

In a very short span of time, multiple powerful, high-profile men in politics, entertainment, and a few other fields were accused of wrongdoing, and in many cases terminated from their jobs. As of 2019, it is clear that this cultural moment is not over, and its final outcomes have yet to be written.

But this quote is from an interview I conducted in 2012 and pertains to a different cultural field entirely—the realm of *open technology*, where makers, programmers, and hackers mingle (online and off) to circulate knowledge and cultural goods, share technical problems and solutions, and generally revel in exploring technical puzzles related to coding and to craft. The interviewee was describing a dominant trend in these circles: snowballing advocacy around diversity and inclusion in voluntaristic technical communities, which had become pronounced as early as 2006. As the #MeToo momentum makes evident, this advocacy in open-technology cultures is an instantiation of a much wider social phenomenon, a collective reckoning with gendered imbalances in social power. This being said, there are features that make open-technology cultures distinct; they are largely convened in places where human resources departments or equal opportunity legislation do not hold sway, as they are voluntaristic, and they are (or have traditionally been) governed relatively informally. This means that participants have historically had little formal recourse to redress instances of either abuse or subtler unequal standing. Moreover, specific cultural barriers to addressing these issues, including the belief that these communities are open to whoever "wants to be there," have tended to perpetuate the notion that if some people are not there, it is because they do not wish to be. Lastly, though this quote makes reference to ugly behavior ("groping"), it would be a mistake to think that advocacy in these communities primarily pertains to ending violent mistreatment. Much more of it has to do with more mundane yet still laborious efforts to place inclusion at the fore and build up infrastructures for support.

Advocacy around "diversity" in software and hackerspace[3] communities, which spans the past decade and continues today, gathered momentum after the 2006 release of a European Union policy study that indicated that fewer than 2 percent of participants in free/libre and open-source software (FLOSS)[4] were women.[5] This appeared to set FLOSS apart from proprietary software development; while still heavily masculine, women's rate of

3. Hackerspaces are community workspaces where people with interest in computers, craft, and other types of fabrication come together to socialize and collaborate.

4. "Free" and "libre" are interchangeable (though the latter nods to languages that are not English), while "open" means something different (see chapter 2).

5. Nafus et al. 2006.

participation in non-FLOSS development was around 28 percent.[6] Participants were galvanized by these findings about FLOSS—what about their communities could account for such a dramatically low rate of participation by women?[7] What interventions were appropriate and effective to change this? A subsequent study, administered in 2013, showed that FLOSS participants who identified as nonmale had climbed to approximately 14 percent.[8] This shows that *something* was happening within these communities, resulting in an increase in participation by women and other people who did not identify as men.

Interventions to change the constitution of and practices within open-technology cultures should be understood as social analysis. Diversity advocacy flows from the same impulse to remake the world that FLOSS does. It is best understood as the practices that result from practitioners' shared belief that there is an error in how open-technology communities have been constituted, one that will leave a corresponding negative imprint on their technical output, which is how they intend to shape the world. Thus their impulse is to correct the "error" in the community (and not to reevaluate whether technology is the seat of progress). In attending to the processes and practices of diversity advocacy, we can observe how this advocacy flows from the social world of FLOSS itself, and attempts to remake it, and thus the world.

At the heart of this book lies the question: What happens when ordinary people try to define and tackle a large social problem? Though open-technology communities possess features different from the culture at large, they nevertheless constitute a laboratory for the voluntaristic address of social inequality. One special feature is, of course, their orientation around technology, which means they are beholden to the cultural legacies of computing and engineering in important ways. Another is their level of commitment to self-governance and autonomy. The hacker ethic includes a devotion to hands-on problem solving, which, this book argues, has led to open-technology enthusiasts trying to hack their communities in real time. In other words, some have addressed their communities with an approach

6. Nafus et al. 2006: 4.

7. It is worth pointing out that industry data may overstate the presence of women in technical fields due to conflation of women employed *overall* in these industries versus women employed in *technical* positions. So it is possible that the glaring 2006 statistics about FLOSS overstated how special FLOSS was in this regard. Thanks to Chris Kelty for discussion on this point.

8. Callahan et al. 2016: 575. Note that the framing of "nonmale" gender shifted during this period from "women" to "women and other people who did not identify as men."

that can be characterized as, *Hey, our culture is informal and constituted by shared interest in taking things apart and putting them back together again, so how hard could it be to change?*

Though this book is eminently sympathetic to these impulses, it shows is that there is a problem of scale for voluntaristic technologists hoping to reframe power relations. Part of the issue is that DIY interventions are insufficient to take on structural social problems (which is not a shortcoming of these communities, or their members' efforts). But it is also worth zeroing in on the analysis itself. Though "diversity in tech" discourse is emanating from many quarters in our current historical moment, it is important that the mandate of open-technology cultures is not identical to that of industry or of higher education. Here, the reasons for engagement with technology nominally include experiencing jouissance and a sense of agency. This is experienced through, yet not reducible to, community members' engagement with technology. If we tease apart the emancipatory politics from the technical engagement, we find that the calls for inclusion and for reframing power relations are not only about technical domains; rather, they are about agency, equity, and self-determination at individual and collective levels. This book argues that the social analysis offered by diversity advocates in open-technology cultures is important, but often incomplete. Calls for diversity in technical participation stop short of calls for justice—and are certainly not interchangeable. A consequence of this elision or slippage is that diversity work has the troubling potential to feed back into status quo arrangements of social and economic power that advocates are nominally critiquing. Therefore, a robust appraisal of power, and of technology's role in reproducing social orders, is required. This has implications that extend beyond open-technology communities. Careful attention to calls for inclusion and reconfiguring power in open-technology communities may, ironically, reach their fullest potential if they disentangle technology from agency. These two points—understanding how diversity advocacy does and does not scale, and where boundaries are drawn in technical communities' critical, reflexive attention to social and technical order—are this book's contributions to social analysis that can enhance and multiply diversity advocates' efforts to generate justice.

This book argues that this diversity advocacy in open-technology cultures holds the keys to a broader emancipatory politics, which is not *technological* emancipation. Precisely because their mandate is not, for example, to capture a wider market share or ready a national workforce, diversity advocates in open-technology communities have the space to articulate not

only the potentials of technological engagement but also the limits. A rigorous analysis of power that emanates from technology-oriented communities is vital as conversations about power and inclusion roil science, technology, engineering, and math (STEM) industries and sites of education in our technologically advanced but socially and economically unequal societies. Ironically, *technical* inclusion may be a red herring when elemental equities have not been established.

The problem of scale can be addressed only through a more incisive analysis. It is ironic that the *hack*, the patch used to fix a bug, which had served practitioners well for technical problems in technical communities of a certain size, is not particularly well suited to the matters that concern diversity advocates. Entrenched social problems are hard to hack away. A more expansive critique that includes labor, class, and the transnational political economy of the material conditions that support Global North hacking is needed if these advocates wish to maximize the potentials of their emergent analysis. This is not a criticism of the individuals who toil at diversity advocacy. To the contrary, their activities represent sincere, vital, and caring[9] energies directed toward improving their communities and, it is hoped, the wider society. Diversity advocates in voluntaristic hacking settings are in a unique and influential position from which to launch a critique, as they are not beholden to institutions and not formally circumscribed by the power relations of workplaces. In other words, their power to effect structural change is limited, but their power to propagate social analysis of the stakes of diversity in tech is great. This is why it is important to bring their analysis into sharper focus.

This book uses the empirical site of advocacy around diversity in software and hackerspace communities to assess engagement with technology as a site of purposive political action. It explores multiple framings surrounding the overlapping issues of who participates in amateur technology cultures, to what ends, and with what consequences. My project here is distinctly *not* to ask (or answer) questions such as, "Why aren't there more women in STEM?" or "How can we bring more African American or Latinx people into STEM?" Rather, I uncover a range of motivations behind amateur interventions into diversity questions, in order to evaluate the political potentials and limitations of such projects. The multiple framings of who participates in technology development, and to what end, are taken as objects of inquiry in

9. As Maria Puig de la Bellacasa writes, care "signifies: an affective state, a material vital doing, and an ethico-political obligation" (2011: 90). See also Martin, Myers, and Viseu 2015.

their own right. The book argues that *technology* is a fraught concept to place in a central role in a project of emancipation, requiring special attention.

Give Me a Hackerspace and I Will Make the World

Hackers exhibit enthusiastic faith in their ability to effect change.[10] The sites of engagement with technology around which diversity advocacy is occurring can be grouped together under the umbrella of *open technology*, especially but not limited to free and open-source software. FLOSS is a set of practices for the distributed, collaborative creation of code that is made openly available through a reinterpretation of copyright law; it is also an ideologically charged mode of production and authorship that seeks to reorient power in light of participants' understandings of the moral and technical possibilities presented by the internet.[11] Hackerspaces are a cognate offline phenomenon, community workspaces where people with interest in computers, craft, and other types of fabrication come together to socialize and collaborate. These sites are far from monolithic, but they are more alike—bound together by a shared (if not singular) political and technical imaginary—than they are different. *Hacking* here is about an expression of agency, and not necessarily a desire to trespass or "own hard" (though some hacking subcultures possess this feature).[12] *Open technology* broadens the ethos of FLOSS to encompass software, hardware, and other cultural artifacts that proponents believe should be left open for the purposes of modification, reinterpretation, and refashioning toward purposes beyond those for which they were originally created. This worldview has implications beyond the forging of new code and technical artifacts.

Hacking and FLOSS participation often take on meaning as communal and shared actions.[13] As Jannie, a volunteer in the Netherlands, put it, "A big part of these groups is social. In that way we are like church groups."[14]

10. This heading title is an allusion to Latour's (by way of Archimedes) "give me a laboratory and I will raise the world," the idea that Pasteur built the strength of the laboratory by inducing and enrolling other elements of the world (like microbes and inscribed information) to run through it (1983). But I am not making a Latourian argument; hacking implies emergence (Kelty 2008).

11. Kelty 2008: 2.

12. Banks 2015; Coleman 2015. To *own*, *0wn*, or *pwn* a server is to gain the top level of access and have free rein to do what you like (Coleman 2015: 160).

13. Coleman 2012a; Dunbar-Hester 2014.

14. Interview, Jannie, April 27, 2010, Amsterdam. Though many hackers are secular and atheist, their reverence for their activities often approaches religious fervor. Sociologist of hacking Sarah Davies writes that in her early research, she "toyed with the idea, eventually rejected, of using

Anthropologist Gabriella Coleman has demonstrated that hackers deploy a range of political stances including agnosticism and denial of formal politics (exceeding software freedom),[15] though implications for intellectual property in particular are at least implicit and often explicit in the technical and social practices of hacking.[16] Scholars have noted that the denial of formal politics makes FLOSS an unlikely site for gender and diversity activism, at least historically.[17] But FLOSS projects are not monolithic, and have matured over time. Arguably, the diversity advocacy that is the subject of this book represents a turning point within the collectivities whose focus is on FLOSS. As will be elaborated in the following pages, the shared enthusiasm for hacking and crafting code that unites FLOSS communities has collided with a realization that to believe that these communities are open in an uncomplicated way is naive. The communities have initiated debate and hacks of their dynamics, and there is no turning back, but these matters are far from settled internally. FLOSS projects and hackerspaces are also in dialogue with the wider culture, which is awash in "women in tech" discourse (including the high profile of Facebook chief operating officer Sheryl Sandberg's 2013 book *Lean In*). The raft of open-technology initiatives around diversity must be placed within this context, while keeping in mind that geek politics exist along a continuum.

Computing has become associated with freedoms, particularly notions of autonomy, self-actualization, and higher selfhood.[18] Common notions of what is at stake in open technology can be seen in this statement: "'Free software' means software that respects users' freedom and community. Roughly, it means that *the users have the freedom to run, copy, distribute, study, change and improve the software.*"[19] In other words, free software is here imagined to support users' autonomy, including expressive individualism. Users' autonomy is sometimes, but not always or even mainly experienced or expressed at the individual level; the community, group, or

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the literature of the sociology of religion—conversion narratives, evangelism, the construction of higher purpose and meaning—to analyse involvement in hacker and makerspaces" (2017c: 225). Thanks to Christo Sims for discussion on this point.

15. The Free Software Foundation explains, "To use free software is to make a political and ethical choice asserting the right to learn, and share what we learn with others. Free software has become the foundation of a learning society where we share our knowledge in a way that others can build upon and enjoy" (Free Software Foundation n.d.).

16. Coleman 2012a. See also Kelty 2008.

17. See Nafus 2012; Reagle 2013.

18. Kelty 2014: 214.

19. GNU Operating System, n.d. Emphasis in original.

project is also a meaningful unit, and its freedom is also important. In North America, this might be the freedom to tinker with a given program in order to modify it to suit one's own desires or to scratch an itch.[20] In Latin America, this might be the freedom to not be subject to intellectual and economic constraints imposed on one's government or education system by a foreign corporation.[21] These freedoms are related and exist along a continuum, but they are not identical interpretations of the scope and mandate of open technology.[22] The articulations of freedom within the FLOSS community matter because at present community members are challenging their cultures from within: How can commitments to freedoms be reconciled with the unequal treatment experienced by some members of the community? For all the rhetorical attention paid to individual freedoms, hacking is suffused with collectivity; diversity and inclusion work insists on *bringing collectivity to the fore*, making self-consciously collective worlds.[23] It is significant that the hacking- and FLOSS-inflected rhetoric of freedom is always ready to hand for those attempting to hack their communities; as one person wrote on a feminist hacking list, "[our] actual goal is freedom from the undesirable attitudes which in partriarchy [*sic*] are hitched to gender."[24]

Hacking Emancipation

In 2006, prominent legal studies scholar Yochai Benkler buoyantly claimed that the "networked information environment" that materially and ideologically undergirds FLOSS "enhances individual autonomy" by "improving [individuals'] capacity to do more for and by themselves; [it also] enhances their capacity to do more in loose commonality with others, without being constrained to organize their relationship through . . . traditional hierarchical models of social and economic organization."[25] He went on, "Individuals are using their newly expanded practical freedom to act and cooperate with others

20. Raymond 1998.

21. See Chan 2013; Takhteyev 2012.

22. As a matter of historical and genealogical accuracy, it is worth noting that there are semantic and ideological distinctions between free software and open source. Yet as they are mobilized by open-technology communities seeking to consider diversity issues, they are more alike than different, which is why I lump them together in this book without hesitation. The term *open technology* encompasses both.

23. Thanks to Sarah Myers West and Mike Palm for comments here.

24. Email,—to [Feminist Hacking List], November 1, 2018. Thanks to Mike Palm for discussion.

25. Benkler 2006: 8.

in ways that improve the practiced experience of democracy, justice and development, a critical culture, and community."[26] Benkler exults in FLOSS participants' "newly expanded practical freedom" and the lack of "constraint" experienced by individuals in FLOSS cultures, and flat out rejects the notion that traditional lines of social organization could be relevant in FLOSS cultures. For him, the improved experience of justice and democracy is without question open to all; FLOSS not only levels social hierarchy but consigns it to irrelevance in all networked modes of collaboration. Coleman uses more tempered language but makes a congruent claim: "The arena of FLOSS establishes all the necessary conditions (code, legal protection, technical tools, and peers) to cultivate the technical self and direct one's abilities toward the utilitarian improvement of technology. . . . FLOSS allows for technical sovereignty."[27] This is a worthwhile summary of the scope and aims of FLOSS, and even open technology more generally, where an emphasis on code may be less central (though open-source software often supports open hardware).[28] Coleman's account is one of the richest cultural studies of the FLOSS lifeworld, enlarging our understanding by accentuating hacking in its idealized form. The backdrop of the ideals that animate FLOSS, against which its shortcomings stand out, sets up the contestations that form the subject of this book.

It is probably no coincidence that as celebration of open technology reached a fever pitch in accounts like Benkler's, diversity advocacy in open-technology cultures also began to heat up. At the heart of the contestations around diversity in hacking and opening up technological participation lies the fact that a substantial appeal of hacking has to do with *agency*. "The emancipatory potential of hacking exists precisely in that it crosses the line of who can access technology," writes Johan Söderberg.[29] The topic of this book is the relatively new but broadly accepted notion that the promotion of diversity in tech[30] is a social good, worthy of attention and advocacy, as well as the exploration of the myriad conceptions of what is at stake for its champions in open-technology cultures. Once again, we should note a

26. Benkler 2006: 9.

27. Coleman 2012a: 120.

28. Powell 2012.

29. Söderberg 2008: 30.

30. Here I use *tech* as a shorthand for development of software, electronics, and computing hardware, following media, education, and industry usage. I do argue however that an all-encompassing notion of *tech*—particularly analytical looseness about tech *participation* and *participants*—serves to reproduce rather than destabilize existing hierarchies and power arrangements.

disconnect between agency as an abstract individual capacity and diversity advocacy, which is necessarily socially embedded.

Access and emancipation are politically charged ideas: they offer liberal subjects inviting opportunities for self-determination as individuals and as collectives.[31] Technology, and computing technology in particular, has a tangled relationship to these political constructs, but in our present age, talking about the machines is never just talking about artifacts decoupled from these political valences. What is worth sustained analysis here is the ways in which technologists identify the tools and techniques that they find particularly emancipating themselves—here, computing, electronics, and related skills. Notably, they continually assert the conjoinment of computing, freedom, and progress. In the words of one prominent diversity advocate, whose technical background included a high-status programming role in a free software operating system project, "Open source was attractive because I never wanted my work to be thrown away. My job [ideally] has to have some sort of transcendent purpose. I loved puzzle-solving, making things work. If there's a problem with a computer, it's because you told it to do something wrong. [Working with code] can bring pleasure, adrenaline, and joy."[32] She neatly articulates many of the core beliefs of open technologists and computing devotees in general. First, the idea that FLOSS has a "transcendent purpose" (in contrast to contract work for industry or government entities); it lives on in the user base, whose members breathe life into it through use and modification. Second, the idea that the computer is a site where desire may be consummated in a joyous, almost formally aesthetic way, though it is also pleasurable in an embodied way to solve puzzles and "make things work."[33] Third—and this is a crucial point to note—her belief that if the computer doesn't work, it's because the user told it to do something wrong. Her quote exemplifies key elements of the belief system that for hackers[34] fuses computing to joy and emancipation.

This belief system animates hackers' extreme fervor for and commitment to computing technologies. It is not a stretch, therefore, to comprehend why

31. Kelty 2014.

32. Interview, Liane, July 24, 2014, San Francisco, CA.

33. See Streeter 2010; Coleman 2012a; Kelty 2008.

34. Here I am using *hacker* in an expansive sense to indicate users who have much closer relationships with computers than those held by average users, which are usually constituted in part by affective connections to this technology. I am using it in spite of the limitations of hacker identity, discussed in the next chapter, and sidestepping the common sensationalist media representation of the hacker.

those who experience these relationships with technologies would identify expanding the ranks of this form of participation as a crucial means of expanding agency for others as well. Hackers (including diversity advocates) are commonly extrapolating from their own experiences to articulate the notion that freedom and progress *for others* must also be related to access and emancipation through computing. As Christopher Kelty writes, "these tools engage our individual capacities to think, create, and manipulate the world, and they transform the collective relationships we have with others."[35] Participation in technical cultures and open technology in particular has been routinely hailed as attractive, even transformative. Indeed, one of the reasons open technology has been so celebrated is because (in conceptions like Benkler's, and countless others) it is held to offer its participants an opportunity to rework social relations, implicitly or explicitly contributing to their empowerment. Fundamentally, expanding this participation is often touted as a shortcut to enhancing political agency for everyone, and in recent years *particularly* for those groups who have been relatively sidelined vis-à-vis technological and political agency. Pursuit of technological emancipation is celebrated as an end run around discrimination and other social constraints.

Though these belief systems are persuasive for those who subscribe to them, we might ask what the consequences are when these beliefs are projected elsewhere. In particular, what are the entailments of exporting a progressive belief in the individual and collective power of technical agency to sites of social and economic inequality? Before we begin to answer this question, however, we should spend a moment unpacking how *technological* progress and *human or social* progress came to be imbricated.

Technology and Social Order (Or, How Hacking and Emancipation Came to Be Linked)

Historian of technology Leo Marx has persuasively argued that technological development was not initially bound to human progress; while it could be in the service of human progress, it was not interchangeable, at least in the early American republic. Importantly, the term *technology* was not widespread, either—its emergence as a prominent term with its present-day import did not occur until approximately the turn of the twentieth century. Preceding terms (such as *machinery*, *the mechanic arts*, and even the word *technology* itself, which did exist but narrowly referred to branches of learning

35. Kelty 2014: 198.

surrounding the mechanical arts) did not carry the same moral charge that today's *technology* does.[36] Indeed, according to Marx, *technology* acquired its potency in order to fill a semantic void, a nineteenth- and twentieth-century cultural longing to describe a novel form of human power that "the mechanic (or useful) arts" were insufficient to encompass, given their association with artisanal labor and individual-scale handiwork. It is this inflated notion of technology we are encountering when the large-scale technological society is imagined (no matter whether this is invoked as a freeing or frightening specter).

It is important to take technology seriously as an object of analysis. This is not nearly so straightforward as it may seem, as technology is as much an ideologically charged domain as it is a mundane artifactual component of everyday life. According to Marx, technology is a "hazardous concept": in our present society, it cannot help but *to stand in for things greater than artifacts*, and it is understood to have profound effects on social order. Conversations about technology are rarely about *artifacts in themselves* (though this phrasing may mislead us into thinking that a clear demarcation of technology from society, from power, and from social order is even possible, or desirable). Many critics of technology and culture have observed that stories told about technology reveal as much about the tellers as about the artifacts, and this is no less true here.[37] For these reasons, technology is a special case for social analysis: it is no less a product of social relations than other domains of culture, but its stature is so great and its shadow so long that it is worth concerted attention.

Marx's account offers a useful and sophisticated contextualization for hackers' and other enthusiasts' technological zeal as well as for the cultural baggage that accompanies this zeal. Hackers pursue technological development in order to maximize "human flourishing through creative and self-actualizing production."[38] Likewise, technology is a unique domain for the discharge of political energies. In the collective imagination, it has been vested with the power to initiate change (even as this belief obscures the role of social and economic relations).[39] Many technologists, especially those in activist geek circles, are motivated by political concerns and seek to build technologies that they believe can shift social power and redress social

36. Marx 2010: 562–64.
37. Sturken and Thomas 2004.
38. Barton Beebe quoted in Coleman 2012a: 15.
39. Marx 2010: 577.

imbalances or inequities. This certainly is true of quite a number of the people in open-technology communities whose efforts are under consideration here. Others, however, believe that "progress depends on the constant expression and reworking of already-existing technology."[40] In other words, the belief that technology is a progressive force outside of political channels is widespread among open-technology enthusiasts, though emphasis can be placed on different aspects of technology development, in particular developing (or reworking) technology for specific political reasons versus keeping technology under development for its own sake.[41] Lastly, and crucially, technologists often feel that dealing with technology offers a more concrete site in which to negotiate power and privilege—that is, it can seem cleaner to work on "technological solutions" than to wade into wider social contestations.

These points all explain why diversity advocacy has taken hold in open-technology cultures. Some community members emphasize the pursuit of both explicit and inchoate political outcomes through technological development. Others view the emancipatory experiences they have experienced working and playing with computers as worthy of export, and a singular and meaningful way to enfranchise people who have been relatively more excluded from various forms of civic, political, and economic citizenship. Often, these views overlap and serve to multiply adherents' commitments to diversity.

Pushback against diversity advocacy does exist, though it gets relatively little attention in these pages. Some can probably be attributed to naivete, the belief that these cultures and practices are already fully open to those who wish to participate. And it is undoubtedly the case that some opponents of diversity advocacy believe in "agency for me but not for thee," for reasons having to do with consolidating their own social and technical power, more or less consciously. Lastly, some articulations of freedom and meritocracy are incompatible with diversity work—for some, this work is seen as inherently nonmeritocratic and thus at odds with the cultural values of the FLOSS community.[42] In any event, the focus in this book is the internal

40. Coleman 2012a: 119.

41. Neither of these beliefs is inherently democratic, and both can be quite technocratic.

42. Thanks to Sarah Myers West for help with this point. Notably, the coiner of the term *meritocracy* intended it as a satirical concept, which was lost on many who uncritically adopted it in subsequent decades (Young 2001; thanks to Peter Sachs Collopy for this reference). At one feminist hackerspace, the wifi password when I visited was "meritocracy is a joke," pushing back on the meritocratic ideal, but only within the subaltern counterpublic of members and vetted

negotiations of diversity proponents and their mediating work within their open-technology communities.

Why does it matter if hackers and open-technology enthusiasts promote expanding the ranks of hacking as a means to wider political emancipation? What is at stake in framing proficiency in computing as a significant path to social inclusion? What is obscured in framing technical cultures as the appropriate site of intervention? And what does calling this *diversity work* accomplish (or fail to accomplish)? This book does not argue for diversity in technical cultures directly. Rather, it is interested in carefully investigating the political implications of diversity advocacy. Even in spite of advocates' often clearly emancipatory objectives, some of their framings of problems and solutions contain the potential to crystallize patterns of power that contravene their intentions. Across the chapters of this book, I argue that diversity advocacy has the most potential to change the expressive culture of open-technology communities. Interventions in these sites can serve as stages in miniature where people confront wider social problems; it can be powerful and galvanizing to strive for inclusivity in a social milieu over which one has some control.

At the same time, change in these communities is challenging, and not necessarily a stand-in for the broader change they hope to see. Though hacking is an exercise in world making, hacking has historically been a significantly different project from the one that diversity advocates are now challenging their communities to undertake. There is a potential disconnect between these local interventions in voluntaristic spaces and the wider, loftier effects that are supposed or hoped to flow from them. In other words, it is not enough to act locally while thinking globally—there are structural forces at work that dictate that these hacks will fall short of advocates' most elevated intentions. This is not to suggest that these interventions are worthless, just that their proponents are up against entrenched, monumental patterns. Partly, this confusion stems from the ways in which technology is hazardous: artifacts and artifactual production can wind up standing in for, or being confused with, social order. But voluntaristic communities, by their nature, are bounded. Open-technology communities are formed around a

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visitors (Fieldnotes, July 2014, San Francisco, CA; see also Skud 2009; Reagle 2017). Amy Slaton has illustrated that meritocratic framings in engineering education were used to deny the fact that race could function as a determinant of students' life experiences (2010: 171). Finally, meritocracy can also be mobilized to argue *for* diversity initiatives (see Fowler 2015), though this is much rarer than "colorblind" (and the like) meritocratic framings.

shared enthusiasm for hacking. Challenges of social structure or systemic inequity are a heavy lift for DIY communities, and communities constituted around technology face unique challenges.

Without referencing these social issues directly, Mel Chua, a self-described "contagiously enthusiastic" hacker, writer, and educator touches on some of them. The social relations and historical patterns that surround computing and hacking are always freighted, and often reflect the priorities and interests of groups with greater social power, including elites, technocrats, and corporations. Chua writes in a 2015 blog post,

> As a kid, I *wanted* to choose the privilege of being oblivious and keeping my head down and immersing myself into the beauty—the sheer beauty!—and joy of STEM for STEM's sake . . .
>
> But I *couldn't* "just geek out about nerdy stuff." The environments where I was trying to "learn about nerdy stuff" were sociotechnically broken in a way that made it hard for me (as a disabled minority woman, among other things) to join in. If I wanted to even *start* being part of the technical community, I had to start by *fixing* the technical community—patching the roof and fixing the plumbing, so to speak—before I could even walk inside and start to live there . . .
>
> It was as if I could only enter the makerspace as a janitor.[43]

To paraphrase Chua, the aesthetic beauty and agentic participation hailed as attractive attributes of technical engagement were less available to her. Even though she showed up excited to partake, there were barriers to her "walking into" the open-technology space, let alone to her "living there." She experienced, firsthand, some of the historical patterns that historian of technology Amy Slaton has called the *relational* nature of science and engineering knowledge, and of technological skill and talent: "All of these relations involve the constant making of knowable students and employees by those with influence."[44] In other words, science and technology have historically been sites for cultural sorting work, separating STEM-capable people from STEM-incapable people. Slaton's analysis suggests that moving some people from one category to another does not destabilize the use of STEM as a site for this kind of problematic cultural sorting.[45] Chua's analysis is more ambiguous: What effect does "patching the roof" have

43. Chua 2015. Emphasis in original.
44. Slaton 2017.
45. Slaton 2017.

beyond a single building? To extend her metaphor, is the plumbing connected to sewer systems and water treatment facilities that taint the tap water?

Scale is an issue here: diversity advocates hope to rectify social problems that are deeply entrenched, which span sites such as higher education and industry, not only their own more intimate voluntaristic spaces. But their own social worlds, closer to home, are composed of people who are led to join by their shared enthusiasm for technology. Their preferred solutions are to hack their projects and cultures—to patch the roof and fix the plumbing. This comes up short as a solution for the problem of unequally distributed social power. In other words, distributing diversity in technical participation is not equivalent to generating justice—and it can never be equivalent. In fact, cultivating diversity without a robust critique of power can wind up placing open technologists' efforts adjacent to the goals of industry and neoliberal government initiatives.

But another problem is conceptual or definitional, having to do with how social problems are framed. If the goal is to distribute diversity, to sow more different kinds of people in technical production, then diversity advocacy is plainly making some inroads, though advocates and other community members may quibble about whether group X or group Y is proportionately represented in project A or project B, etc. But as feminist theorist Sara Ahmed argues, "diversity" inheres in individuals: "diversity is what individuals have *as* individuals."[46] Moving the needle on the individuals' diversity in a given project or institutional setting "gives permission" for people to turn away from institutional or societal inequality.[47] Put differently, to frame social inequality as a question of diversity in technological production, and to expect to change wider inequities by adding "diverse" individuals to technical cultures, is to misunderstand how the distribution of various social identities in a given sector are *outgrowths of differential social power*, not the other way around.[48] As political theorist Joan Tronto writes, "the process by which we make some questions central and others

46. Ahmed 2012: 71. Emphasis in original.

47. Ahmed 2012: 71.

48. Harding 1995. In her foundational study on early communities in cyberspace, Lori Kendall writes, "The culture of [her research site] and similar online spaces have been constructed by people from particular (relatively homogeneous) backgrounds. As such, these cultural contexts continue to appeal to people from those backgrounds and to re-create particular meanings and understandings. *Increases in online diversity will not necessarily change these existing norms*" (2002: 216, emphasis added).

peripheral or marginal is not simply a benign process of thought."[49] In social analysis and intervention, where the borders of care are drawn is critical.

The project of this book is to name and elucidate these dynamics in order to help advance a political project of justice in a technology-oriented world. It is important to recognize and validate the critiques of power that are emanating from open-technology communities. But what this book suggests is, if technical enthusiasts are experiencing their consciences being stoked vis-à-vis unequal technical participation, they stand to gain from placing their critiques into productive dialogue with conceptions of these problems that can help illuminate the ways in which STEM participation both is and is not contiguous with social and economic power writ large. To have a clearer understanding of what various concerns and interventions around diversity can and cannot accomplish is to set the stage for confrontations that may allow more concerted, less prefigurative changes to become possible.

If Diversity Is the Answer, What Is the Question?

Up front, it should be noted that I do not attempt to define diversity or hold fast to any particular definition in this book. I treat the concept as an "emic" one, emanating from within the communities that form the subject of this study. The questions I ask are: Why is diversity so important? and, What work is diversity doing (or meant to do) in these cultural spaces? As Sara Ahmed writes, the "mobility of the word 'diversity' means that it is unclear what 'diversity' is doing, even when it is understood as a figure of speech."[50] In other words, even though we understand what diversity means, it is not clear what work it is doing, or is meant to do. Her observation rings true here, and thus the book's agenda is to map and analyze where diversity has traction, and what work it is doing. The mobility and the limits of diversity are of primary significance in this book. Sometimes, its ambiguous meaning is part of what makes diversity work as well as it does; it is shifting and nebulous, ripe for appropriation in different contexts, with a protean (and contested) political valence.[51]

The mobility of *diversity* is easy to grasp, as it is a ubiquitous term and concept. Our contemporary moment is saturated with exhortations for women and members of other underrepresented groups (but particularly

49. Tronto 1993: 4.
50. Ahmed 2012: 58.
51. Thanks to an anonymous reviewer for helping draw this out.

women) to take up participation in STEM. "*Building up young people of color in tech* so that we can finally tackle structural inequity and disparity in this critical industry . . . [is] integral to the advancement of social justice in America,"[52] writes Dream Corps, commentator Van Jones's "social justice accelerator." At the time of this book going to press, the National Center for Women & Information Technology (NCWIT) reports that 26 percent of the US computing workforce are women and less than 10 percent are women of color; 5 percent are Asian, 3 percent are African American, and 1 percent are Hispanic.[53] Rationales for this push to increase STEM participation vary, but common ones are national competitiveness and women's economic empowerment. (NCWIT also claims that by 2026, 3.5 million computing-related job openings are expected, and that at the current rate only 17 percent of these jobs could be filled by US computing bachelor's degree recipients.) Both of these rationales could be found on the Obama White House's website in 2015: "Supporting women STEM students and researchers is . . . an essential part of America's strategy to out-innovate, out-educate, and out-build the rest of the world"; and "Women in STEM jobs earn 33 percent more than those in non-STEM occupations and experience a smaller wage gap relative to men."[54] The Trump administration removed this page but also touted a memorandum to increase STEM education funding.[55] In Canada, Prime Minister Justin Trudeau claims to be building a feminist government, mandating diversity and inclusion frameworks under all government policies and programs.[56]

Industry, too, often regards increased women's participation as desirable. Google neatly summarizes a 2015 corporate agenda surrounding women in technology fields on a webpage: "Technology is changing the world. Women and girls are changing technology . . . We always believed that hiring women better served our users."[57] In other words, the corporation's full

52. Email, Dream Corps mailing list, February 16, 2019. Emphasis in original. Thanks to Chenjerai Kumanyika for discussion.

53. National Center for Women & Technology. I use *Hispanic* here because NCWIT does. See Margolis 2010.

54. "Women in STEM," n.d. The page also quotes President Barack Obama as having said in February 2013, "One of the things that I really strongly believe in is that we need to have more girls interested in math, science, and engineering. We've got half the population that is way underrepresented in those fields and that means that we've got a whole bunch of talent . . . not being encouraged the way they need to."

55. United States, 2017.

56. Prasad 2018. Thanks to an anonymous reviewer for pointing this out.

57. http://www.google.com/diversity/women/index.html, accessed February 2, 2015. Another Google page additionally stated, "Our goal is to build tools that help people change the

market potential is not being realized without a developer base that can cater to diverse users. On another page, entitled "Empowering Entrepreneurs: Our Future," Google explicates the global reach of its vision and reiterates that technology is a route to empowerment: "Archana, an entrepreneur from Bangalore, shows how women are using technology to better their businesses, improve their lives and make their voices heard around the world."[58]

In many ways, the diversity advocacy that I examine in this book bears similarities to government and industry agendas. But unlike White House policy or Google programs, the initiatives I examine are driven by the voluntaristic ethos that surrounds FLOSS. We have to explain why fairly grassroots civil society groups also are pouring their energies into this diversity advocacy, often as volunteers. Diversity advocacy here is not necessarily identical to corporate, higher education, or government agendas, though there is certainly overlap. To tease out these similarities and differences requires careful parsing of the values and import vested in open technology.

It is also important to note that the *who* of diversity is flickering, not holding fast to a single definition or category of people. We might ask, whose diversity is most symbolically or strategically important, and why? In the earliest and widest instances of diversity advocacy, the *who* of diversity usually means *women*, as above examples illustrate.

This is not, of course, the extent of diversity that mattered and matters to advocates. Revisiting the comments by Mel Chua, above, we see a departure from gender as a primary identity category, as she invokes not only being a woman but also her status as a disabled person and her membership in a minoritized ethnic category (she is deaf and self-identifies as Chinese–Filipino American).[59] This represents a deepening understanding of "diversity," including a perceived need to be more intersectional.[60] By that same token, it represents the fact that many advocates found that agitating for "more women" was inadequate as a diversity goal. In other words, if diversity meant more women, for example, what did that leave out? Perhaps people from racial and ethnic backgrounds less likely to be present in

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world, and we're more likely to succeed if Googlers reflect the diversity of our users" (http://www.google.com/diversity/women/our-work/index.html, accessed February 2, 2015).

58. http://www.google.com/diversity/women/our-future/index.html, accessed February 2, 2015. Note that while my research sites are mainly in North America, Archana is in India; technical work is used to bring people into globalized capitalism, literally and figuratively (Freeman 2000; see also Qiu 2016).

59. Chua n.d.

60. Combahee River Collective 1977; Crenshaw 1991.

open-technology communities? Or an understanding of gender that is less binary? People outside of North America and Europe? Advocates are not wrong to draw attention to the lack of representation of various groups in open-technology communities.

Going further, though, how do these multiple framings of identity within open technology serve to produce a politics of representation? What are the consequences of this act of production? What does a politics of representation fail to capture? This book argues that the current advocacy around diversity in open technology, with its emphasis on identity categories, largely circumscribes core questions about social and economic power that are suggested by advocates' engagement with diversity in open technology. An issue in need of recognition is that many advocating for diversity are located in North America and Europe—that is, in the Global North. In advocating for more women, a more expansive notion of gender, or more members of minoritized racial and ethnic groups in open-technology communities, advocates overlook the fact that there is a global underclass whose work materially supports the productive power of open technology.[61] In other words, the material and discursive output of FLOSS is quite literally made possible by labor that extracts raw material and manufactures hardware, which allows FLOSS and hacker communities' technical engagement. If we zoom out from the Global North and take an expansive notion of tech work—including the labor that undergirds hacking and open technology—it can hardly be said to have a diversity problem per se, because women workers of color actually abound. Thus, the diversity problem with which advocates mainly struggle must be seen in context as an attempt to *expand the ranks of an elite position within global capitalism*—high-status, well-paid tech workers. The diversity advocacy that forms the subject of this book attempts to change the constitution of open-technology communities while struggling with its ability to realign the social and economic power relations in which open-technology work is implicated.

As stated above, I do not attempt to define diversity or claim that one single definition of this concept suits the work I am doing here. Instead I regard it as a keyword that emanates from open-technology communities (though it does not originate with them, of course). I am interested in the work that it does in the social imagination of amateur technology cultures

61. Qiu argues that, far from being new, shiny, and digital, these conditions are an outgrowth of old industrial geopolitics (2016).

centered on "open stuff."[62] In my conception, it is precisely the murky outline of diversity that allows it to attain power, especially as it is not a value to which many people are easily opposed.[63] In some ways, diversity advocacy in these sites simply mirrors wider roil about less-than-equal standing and mistreatment of minoritized people in a variety of settings, which has become visible in campaigns from the life-and-death stakes of the Black Lives Matter movement[64] to feuds about representation embodied by, for example, the #OscarsSoWhite campaign about race and inclusion in Hollywood. But this centering of effort around a *technical* domain is significant and singular because of how technology is understood as a special and potent site within our culture.

It is essential to keep in mind the history of science and technology being touted as universally accessible and meritocratic *while in practice serving as sites of social sorting*, as indicated by Slaton. As Ahmed argues, "adding color to the white face of the organization *confirms the whiteness of that face*"[65]; decentering the dominance of certain groups requires more than simply adding members of minoritized groups. This seeming paradox may partially account for the ambivalence that some people of color feel with regard to the overtures of would-be white allies around diversity in tech (discussed in chapter 7). It also underscores that while attention to diversity is necessary, it is far from sufficient for an antiracist social justice agenda. In her research on low-income women's experiences with the "high-tech future" promised by digital technology, Virginia Eubanks describes a woman with a computer science degree who worked as a bus driver, because her son was disabled. Her responsibilities for care meant that she was unable to retain a position in the high-tech field for which she had been trained.[66] This kind of care work falls disproportionately to women and mothers. In drawing together these observations, I do not mean to suggest that diversity advocacy in open-technology communities is hopeless or without merit—only to illustrate

62. Skud 2011.

63. Exceptions exist: when diversity is interpreted as affirmative action or as at odds with meritocracy, opposition in FLOSS can be intense.

64. Rickford 2016; Mislán and Dache-Gerbino 2018.

65. Ahmed 2012: 151, emphasis in original. Ahmed writes that "diversity pride" may demand solidarity with whiteness. On the other hand, Ralina Joseph explores the "strategic ambiguity" of "postracial" terms like "inclusivity" and "humanity," arguing that they can be a way of naming and resisting racism (2018).

66. Eubanks 2012: 75.

that the terrain upon which advocates stage their interventions is a top layer resting upon sedimented strata that, not unlike geological formations, have formed over time through immense force. Rather than assuming that diverse people cultivating diverse technologies will lead to a more egalitarian and empowering technological future, it is essential to keep at least one eye squarely trained on the social and economic conditions that group people and endow them with differential opportunities, and how *technology itself* is implicated in projects of social sorting and domination.

How This Book Is Organized

Across the chapters, the central themes in this book have to do with how diversity advocates define their borders of care (principally: they care about promoting justice and equality broadly construed, but tend to limit intervention to already-constituted and bounded technical cultures, with ambivalent results) and how they are continually confronted by problems of scale, in that they are seeking wider emancipation but are limited to hacking versus effecting deeper structural transformation. It proceeds as follows. Following this introductory chapter, chapter 2 provides a historical background of the cultural strands that intertwine to produce diversity advocacy in open technology. It gives an overview of the history of women in computing, cyberfeminism, and hacking and FLOSS, while challenging conventional accounts of hacking. Chapter 3 explores what diversity advocacy builds in terms of techniques of governance and sociality to support a subaltern counterpublic and to speak back to a wider collectivity of open technologists; it illustrates the painstaking local-ness of many infrastructural interventions. Chapter 4 continues to examine what is built on a more literal artifactual level, describing what is being produced in sites of diversity advocacy, including code and craft. It argues that the significance of much of this material production is symbolic identity work; care is manufactured as much as things. Chapter 5 examines diversity advocates' imaginaries of work and labor, many of which are contradictory, both aligning with and critiquing market values. This topic matters because, especially as advocates envision their practices as potentially promoting worker power, their analyses generally do not fully account for the protean boundaries of so-called tech work and actual, material labor conditions, including the lower-status labor that supports Global North hacking. Chapter 6 follows diversity advocacy as it intersects with political stances that relate to but are broader than diversity advocacy: social justice activism, antimilitarism, and anticolonialism. These

are sites where feminist hackers in particular often articulate connections to broader values that can inform hacking (and vice versa), but often stop short of full-throated critique, in part because of the ambiguous relationship of their activities to paid labor (some of which is laid out in chapter 5). Chapter 7 explores social identity and multiple conceptions of who might embody the *missing diversity* in open-technology cultures, from the perspectives of diversity advocates. It discusses gender, race, and ethnicity; proposes that representation has its limits as a project of empowerment; and suggests, again, that workplace relations to some degree constrain the criticism that advocates express. Chapter 8, the conclusion, pulls together threads in the previous chapters to assess the potentials and limitations of diversity advocacy in open technology as a site for claiming equal rights, and as a quest for representation; it also evaluates the market logics that accompany this advocacy. Finally, it meditates on the challenges inherent in centering a project that insists on a redress of imbalances of power around technology, arguing for a project of justice and equity that ironically decenters technology as a primary axis of intervention. It argues that while voluntaristic tech communities cannot singlehandedly attain the scale of the endeavors they hope their interventions will address, they are well-positioned to offer care and analysis that can set a more expansive, yet more rigorous, agenda.

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