This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

5 "Let the Private Sector Take Care of This": The Philanthro-Capitalism of Digital Humanitarianism

Ryan Burns

Introduction

At the heart of this chapter lies the imperative to understand a confluence that is centrally shaping digital economies at the global margins.[1] On the one hand, crowdsourcing, social media, and mass collaboration are increasingly affecting the humanitarian enterprise through *digital humanitarianism* (Meier 2015); on the other, private for-profit companies are becoming more involved in humanitarianism under the banner of *philanthro-capitalism*, commonly labeled "corporate responsibility" (Bishop and Green 2008). These two distinct shifts together are having profound effects on humanitarian knowledge, aid allocation, and humanitarianism's raison d'être. In fact, while much has been written about each of these developments individually, here I argue that they are integral components of the same process, which will significantly influence how humanitarianism is conducted in the twenty-first century.[2]

Following the historical arc of "disruptive" technologies, we can see that for more than a decade, technologists have been developing digital spatial technologies that they hope will "revolutionize" humanitarianism (Meier 2012).[3] Many claim these "liberation technologies," as they are often called (Meier 2015), can increase democratic decision making, citizen empowerment, and civic engagement, effectively dislodging humanitarianism from its established modus operandi. This trend seeks to accentuate more "voices" by crowdsourcing knowledge and recruiting labor in platforms like OpenStreetMap, Ushahidi, Tomnod, and the Standby Task Force, and by scraping social media resources like Twitter, Facebook, and Instagram. The evidence for digital humanitarianism's impact is mixed (Brandusescu, Sieber, and Jochems 2015; Read, Taithe, and Mac Ginty 2016). But, more importantly,

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

digital humanitarianism has been shown to be a fundamentally social and political enterprise rather than a technical advance (Burns 2015b; Duffield 2016; Finn and Oreglia 2016). Thus, because the development, use, effects, and assumptions of digital humanitarianism are inherently situated within sociospatial contexts, those contexts themselves necessitate critical scrutiny (Burns 2014; Crawford and Finn 2015).

Concurrently, private for-profit businesses have become more intimately involved in philanthropy and humanitarianism. Most paradigmatically, this shift is characterized by private companies positioning philanthropy at the center of their business model, such that the act of philanthropic giving generates profit for the company. In this new age of philanthro-capitalism, companies accumulate capital by leveraging moral economies (Fridell and Konings 2013). The business models of shoe company TOMS and Starbucks' Ethos Water exemplify this shift, in that for the former, for every pair of shoes someone purchases, a second pair is donated to "a person in need";[4] and for the latter, US$0.05 is donated to charity for every bottled water purchase. Slavoj Žižek (2010, n.p.) has argued that far from this shift being a political-economic exception, "charity is no longer an idiosyncrasy of some good guys here and there, but the basic constituent of our economy."

In this chapter, I argue that these phenomena signal broader shifting relationships between the state and the private sector, enabled through digital humanitarian technologies. These shifts increasingly inculcate private for-profit logics, rationalities, and imperatives into humanitarianism, aid relief, and most broadly the public sector. More specifically, I argue that in the context of increasing austerity and the drive to "do more with less," humanitarian organizations see digital spatial technologies as an innovation that enables their continued functioning. In the process of adopting digital humanitarianism, the project of humanitarianism becomes more capitalist. I substantiate this argumentation by drawing on ethnographic research conducted in 2012–2013 with a public policy research institution involved in efforts to proliferate digital humanitarianism in the public sector.

I begin by contextualizing the emergence of digital humanitarianism and philanthro-capitalism within existing research. Following a brief description of the broader research project from which this chapter draws, I develop my argument along two lines. First, I demonstrate that for public

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

sector humanitarian agencies, digital humanitarianism represents an "innovation" that assuages the pressures created by neoliberal reforms. Second, these incursions of the private sector into humanitarianism can be seen as philanthro-capitalism, wherein for-profit institutions and their charitable arms accumulate capital by developing digital humanitarian technologies and data. I conclude by arguing that private for-profit businesses benefit from these new configurations at the expense of those who produce and process digital humanitarian data.

The Social Origins of Digital Humanitarianism

Many histories of digital humanitarianism begin with the use of Ushahidi, Mission 4636, and OpenStreetMap in the response to the 2010 earthquake outside Port-au-Prince, Haiti (Sandvik et al. 2014; see, for example, Meier 2015). In the earthquake's aftermath, Mission 4636 collected SMS messages sent to a dedicated number; these messages typically requested resources, aid, or assistance (Burns 2015b). Geographically disparate volunteers translated, georeferenced, categorized, and amended these messages through the Ushahidi interface (Meier and Munro 2010). Many digital humanitarian organizations have since been established (and some terminated), including the Standby Task Force—loosely coordinated individuals who are tasked with data collection, processing, and mapping by formal humanitarian organizations—and the Digital Humanitarian Network—a liaison between the different digital humanitarian organizations working on a project (Crowley and Chan 2011). Increasingly spotlighted in contemporary digital humanitarian debates are the roles and purposes of unmanned aerial vehicles (UAVs, commonly "drones"; Sandvik and Lohne 2014), and the insights that may be generated by analyzing social media (Robinson, Maddock, and Starbird 2015). In contrast with this origin story, however, many technologies and constituent phenomena associated with digital humanitarianism were in use prior to 2010, emerging from complex histories surrounding data, software, hardware, and peer production (Roche, Propeck-Zimmermann, and Mericskay 2011; Barnes 2013).

Indeed, many have argued that these contexts indicate that digital humanitarianism should be conceptualized as not merely a technological advance, but instead an assemblage of knowledges, social relations, and

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

political imperatives.[5] Some research is now beginning to theorize digital humanitarianism as such, in contrast with early research, which largely sought to characterize the field and identify pressing technical issues such as privacy, data quality, and intellectual property (Goodchild and Glennon 2010; Liu and Palen 2010; Burns and Shanley 2013). I have argued (Burns 2015b) that digital humanitarianism has not ushered in a fundamental "revolution" but is instead a set of shifted practices toward data collection and processing, which make epistemological claims regarding what can and cannot be known about crises. These technologies themselves did not emerge out of a teleological, apolitical "progress" but instead are the outcomes of complex sets of negotiations around how knowledge and needs can be captured as data and represented cartographically (Burns 2014). Building on much broader conversations, here social relations are embedded within, and are in turned shaped by, data models, software code, hardware, protocols, and infrastructural knowledge (Graham 2005; Kitchin and Dodge 2012; Dalton and Thatcher 2014; Kitchin 2014). For humanitarianism, then, the use of digital technologies plays a significant role in shaping how crises, individuals, and knowledge come to be known, and by extension, the forms of social and political action appropriate for addressing them (Jacobsen 2015; Finn and Oreglia 2016).[6]

Within this set of discussions, digital humanitarianism's implications within political economy are under-researched. This is despite much research showing that digital and web-based spatial technologies profoundly affect urban consumerism (Graham 2010; Thatcher 2013), constitute markets and protectionist capitalist practices (Leszczynski 2012; Dalton 2015), and become sites of capital accumulation (Cupples 2015; Thatcher, O'Sullivan, and Mahmoudi 2016). In fact, in recent years, private businesses have begun playing an increasingly important role in digital humanitarianism, raising important questions that have yet to be addressed in research. Duffield (2016) has argued that the affirmatory politics of digital humanitarianism—"celebrat[ing] the restorative powers of smart technologies and fast machine thinking" (149)—negates any potential critique of existing capitalism. That is, the celebratory discourses surrounding digital humanitarianism contrast with late-modern capitalist trends toward precarity, crisis, and neoliberalization. For Duffield, however, the connections between digital humanitarianism and these economic turns are merely coincidental

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

rather than causally related. I now turn to these emergent trends within capitalism.

No Free Gift: Philanthro-capitalism and Humanitarianism

The current political-economic moment in the Global North is often characterized by neoliberal reforms. These typically entail what Peck and Tickell (2002) call the dual "roll-back" and "roll-out" of the public sector, releasing roles and responsibilities to the realm of capital accumulation while developing the frameworks within which this capital can be readily accumulated. Neoliberalism as a hybrid political and economic project is guided by logics emerging from the private for-profit sector within capitalist economies, primarily driven by a reliance on free market principles and the posited superiority of the "competitive individual" (Hall, Massey, and Rustin 2013, 9). Yet it "looks" quite different in different venues, geographies, and technological moments, as well as with different actors and institutional relationships involved. The goal of research, then, is to explain the forms neoliberalism takes across different contexts (Larner 2003; Peck 2006).

Neoliberalization has produced humanitarian contexts in which new labor practices must emerge. For humanitarian practitioners, an emerging idea is that new forms of labor are able to mitigate the harmful effects of capitalism (Roy 2010). Within humanitarianism, neoliberal reforms have resulted in a climate of austerity, an increased role of the private and nongovernmental (NGO) sectors, and the incursion of capitalist rationalities (Roberts 2014; Mitchell and Sparke 2016). That is, private sector involvement in humanitarianism incorporates and normalizes metrics stemming from the drive for capital accumulation, such as "return on investment," "poorly performing countries," and "freedom of choice" (Carbonnier 2006; Mitchell 2016). This has had the twofold effect of major humanitarian institutions facing decreased budgets concomitant to an increased role of private sector contractors in humanitarian work, in what Norris (2012, n.p.) calls the "development-industrial complex."

Within this context private companies have begun making philanthropy and humanitarianism central to their business models and strategies. This marriage of profit motives and charity, which many call

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

philanthro-capitalism, is enabling capital accumulation within humanitarianism; indeed, it is transforming the act of humanitarian assistance into the very means of accumulation (Morvaridi 2012; Fridell and Konings 2013). Philanthro-capitalism does this through a moral economy: it promises that by buying a product, the consumer is "buying into" a good philanthropic cause (Žižek 2009; Mitchell 2016).[7] The consumer, presumably, then wishes to purchase these products to help a disadvantaged community somewhere in the world. More indirectly, celebrities and icons of "success" (e.g., Bono and the Bill & Melinda Gates Foundation) are increasing collective influence over philanthropy and humanitarianism through actively promoting private sector companies and contractors in humanitarianism and philanthropy (Jenkins 2011; Hay 2013; Mitchell and Sparke 2016). This changes the terms of the debates around humanitarianism, deepening market-based rationalities and normalizing large-scale political-economic trends toward austerity (Adams 2013; Loewenstein 2015). It is in this sense that McGoey says "there's no such thing as a free gift" in philanthropy (2015).

Still, researchers have largely theorized this emergent shift toward philanthro-capitalism in humanitarianism independently of digital spatial technologies. While understanding that spatial technologies are embedded within, are coconstitutive, and compose entire economies, researchers have not to date drawn lines between philanthro-capitalism's emergence and the technologies through which this emergence is enabled. Roy (2010), for example, accounts for smartphone apps that streamline microfinance delivery while producing capitalist market subjects, but for her the app is coincidental to the microfinance industry. Elwood (2015), on the other hand, demonstrates how the spatial technologies employed by Kiva, a microfinance organization, produce a visual and affective way of understanding poverty, global political economy, and subject positionalities. Likewise, Maurer (2015) has shown that mobile payment platforms and apps have been a necessary condition for the proliferation of many capitalist markets in the Global South, and they have "captivated industry and philanthropic attention" (2015, 127).[8]

These two bodies of research—digital humanitarianism and philanthro-capitalism—ask us to look more deeply at the ways spatial technologies are situated within, and enable, political-economic reforms. If philanthro-capitalism has emerged in the context of neoliberal reforms toward

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

humanitarianism, and digital humanitarian technologies enroll the new labor practices propagated by these same processes, analytically tying the two together can offer insights into the ways in which emergent technologies shape economies at the global margins.

The Extended Case Method

Below I draw on a one-year research project that employed the *extended case method* (Burawoy 1998). The extended case method is a theory-driven inductive analytic framework for generating theoretical propositions from evidence. Over the course of the year, I examined the institutional relations and imperatives underlying digital humanitarian technology adoption, usage, and development. My particular use of the extended case method entailed a combination of ethnography, in-depth semistructured interviews, and archival analysis. The ethnography combined work with a public policy research institute at the forefront of debates about public sector use of digital humanitarian technologies, and participant observation with digital humanitarian communities. Within this ethnographic work, I hosted and attended numerous conferences, workshops, and digital humanitarian "deployments," with the intention of understanding the complexities of public sector digital humanitarian adoption. These were attended also by high-level managers at international and domestic humanitarian agencies, digital humanitarian communities, academic researchers, and policymakers. This ethnographic work led to interviews with many of these leaders in the field, as well as archival analysis on social media, after-action reports, blog posts, crowdsourced maps, and policy white papers.

I transcribed and coded these data to identify patterns and trends around the interinstitutional pressures and opportunities for adopting digital humanitarian technologies. This involved discourse analysis with attention to how leaders in the field understand the roles and relationships between humanitarianism, the private sector, and spatial technologies. All quoted interviewees in this chapter have been pseudonymized, with all identifying information removed. Although the claims I cover emerge from the particular case I investigated, this case provides a unique window into how digital humanitarianism works and how formal humanitarianism is changing. Thus, despite my relatively small sample size, the principles I elucidate have strong theoretical purchase beyond my individual case.

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

Austerity and Innovation

The current "humanitarian moment" (Fassin 2012) is characterized by the incursion of capitalism into humanitarianism. The roles, rationalities, and imperatives of humanitarianism are being reconfigured to align more closely with those of the private for-profit sector. Digital humanitarianism plays a significant role in this reconfiguration. First, for the public sector, digital humanitarianism is the "innovation" that allows continued operation in the context of increased drive for efficiency, austerity, and decreased expenditures. This innovation constitutes a new wave of neoliberalization of humanitarian aid, in which, *via digital humanitarian technologies*, humanitarianism becomes a new site for capital accumulation. Second, for digital humanitarianism, the new roles of the private sector take the form of philanthro-capitalism, wherein private businesses and their philanthropic/charitable extensions generate profit through developing the technologies used in digital humanitarian operations. Importantly, by relying on unquestioned assumptions about the inherent "good" of philanthropy and humanitarianism, this private sector involvement is depoliticized, meaning it obscures the trade-offs and consequences of digital humanitarianism and removes them from the realm of legitimate critique.

For the formal humanitarian sector, digital humanitarianism is an innovation that allows continued operations in the context of precarious formal funding sources. This "innovation" comprises the new techniques, approaches, technologies, and procedures that reconfigure how the public sector relates to the private sector. Under new regimes of private sector rationalities and cutbacks, those who manage humanitarian aid are increasingly feeling pressure to more efficiently and wisely allocate their (labor, funding, technology) resources. Lauren, who works for a major US-based development agency, and who prior to our interview had recently conducted a digital humanitarian crowdsourcing project, characterized this pressure: "Without crowdsourcing we didn't have the resources or the time to [process data] ourselves, so that's why we really needed to rely on the public. And I think having crowdsourcing as an option for government agencies, especially in this financial time when you see sequestration happening and people having to do more with less, that we have no choice but to rely on and really engage the public."

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

As Lauren points out, this process is emblematic of broader public sector trends toward austerity and retrenchment. By her way of thinking (in a sentiment reflected broadly across my interviews with the public sector), the "public" constitutes a pool of reserve labor that can be mobilized via digital humanitarianism to meet increasing pressures for decreased resource expenditure. This at once creates a pool of reserve labor and makes that labor contingent on humanitarian project funding and initiatives. Importantly, Lauren is cognizant of these pressures and the search for new reserves of labor that they elicit. In this way, the statement should be understood as pointing to shifted data collection and production practices brought into being by emergent institutional imperatives.

Digital humanitarians promote the message that their mass collaboration tools *immediately* improve efficiency, presenting this narrative in most of their interactions with the public and with the formal sector. Jasmine, a leader of one of the largest digital humanitarian communities, provided a comprehensive depiction of this narrative. Asked what benefits her organization gives humanitarian agencies, she said, "Part of it is just pure manpower. … If we can get 200 people working … across time zones … when Geneva is asleep and everybody else is still working away, by the time that they wake up they see that a massive amount of work has been done overnight. And it gives them a sort of 24/7 workforce. … So I think that's not something that a lot of organizations would typically have in-house, is a breadth of really strong technical people that can work across time zones."

In this hypothetical scenario, the data producers and data-processing capacity are expanded beyond the state and formal humanitarian agencies. Typical of contemporary conceptualizations of neoliberalism, formal institutions delegate data production and processing responsibilities to digital humanitarian organizations and, by extension, to the large numbers of contingent laborers who contribute to these projects. Her account stands at odds with the previous quotation. Lauren accounts for the new practices and institutional changes necessary to adopt digital humanitarianism, whereas Jasmine assumes immediate improvement. Jasmine, in her attempts to market digital humanitarianism as the innovation needed by the public sector, offers idealistic descriptions of the technologies and communities. In both cases, the interviewees have identified digital humanitarianism as

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

an innovation that allows humanitarian agencies to resolve their broader drive toward efficiency.

At the public 2012 “Connecting Grassroots to Government” workshop at the Woodrow Wilson International Center for Scholars, Eric Rasmussen (CEO of the private business Infinitum Humanitarian Systems and adjunct associate professor of medicine at the University of Washington) stated, “Robert Kirkpatrick, who’s now at the U.N. Global Pulse program, used to be at Microsoft. And he used to argue that—in these discussions, please *let the private sector take care of this*. We will address this problem for you, we will take the research, we will commercialize it, and we’ll sell it back to you for cheap. Everybody will be happy.” (Woodrow Wilson Center 2012b, n.p., emphasis mine.)

Rob Munro, founder and CEO of the private company Idibon, followed this up immediately: “I’ll second what Eric Rasmussen said about letting the private sector take care of this. Natural language processing and machine learning is just kind of that level of complexity beyond what you would get in most very good engineers who are working with NGOs. It’s something that you want to give to the private sector” (Woodrow Wilson Center 2012b, n.p.).

These two quotations reveal that private sector involvement is seen to “make sense” by appealing to saving resources, as well as relying on notions of what the public sector is able to deliver. The emergence of such new data sources intertwines technical power limitations with technical expertise and time pressures. Both Rasmussen and Munro owned private businesses, Infinitum Humanitarian Systems and the now-defunct Idibon, respectively, that stood to benefit from the shift they encouraged in those quotes. By “letting the private sector take care of” digital humanitarian technology development, Rasmussen and Munro were both likely to see financial gain. Nonetheless, private sector companies become involved in humanitarianism because it ultimately—in their conception—leads to a greater “good,” while generating new sites for capital accumulation. To do so, humanitarianism shifts to align itself more closely with private sector rationalities, including liberalizing market logics, decreasing public dependence on the formal/public sector, and adopting the techniques and language (e.g., investments, profit, “best practices”) of the private sector.

Digital humanitarianism is a channel through which the private sector enters humanitarianism. Private sector businesses such as Esri, Google.org,

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

DigitalGlobe, and TechChange have all developed the tools and languages for digital humanitarians through, for example, the Google Crisis Response Team, DigitalGlobe's donations of imagery to OpenStreetMap, and Tech-Change's educational offerings in technology for emergency response (see figure 5.1).[9] These companies have been making inroads into digital humanitarianism in venues such as the International Conference of Crisis Mappers (ICCM), public policy workshops, and Esri's Disaster Response Program. For digital humanitarianism, the private sector enters directly by developing the tools, technologies, and data-sharing agreements for such encroachment, and indirectly through prioritizing logics such as profit and efficiency.

Philanthro-capitalism and Digital Humanitarianism

Private sector incursions into humanitarianism via digital technologies take the form of philanthro-capitalism, which here refers to private sector companies intervening in humanitarianism ultimately to accumulate capital. It appeals to contemporary economic ideology—generally that of neoliberalism—as well as digital humanitarianism's innovative nature. These factors depoliticize digital humanitarianism, setting its trade-offs and consequences outside the realm of legitimate critique.

In recent years, private businesses have begun investing heavily in charity and philanthropy, often incorporating these missions directly into their product marketing. This "enlightened capitalism" (Essex 2013, 152) situates the private sector as an important actor in humanitarian interventions. In this new configuration, the private sector provides financial support, project management, and services provision. It prioritizes economic and operational efficiency, often invoking the private sector to reach that goal. For example, in January 2016, UNICEF launched a "venture fund" to provide financial resources to "open source startups" that "brings together models of financing and methodologies used by venture capital funds" (Acharya 2016, n.p.; see figure 5.2).

Digital humanitarianism is a practice of philanthro-capitalism in that private for-profit businesses are involved in such philanthropic causes as a means of accumulating capital, and they do this both through developing the digital technologies for use in crises and by serving as a source for the logics and rationalities under which digital humanitarianism

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

Figure 5.1
Amazon has partnered with the Standby Task Force to mobilize a moral economy that encourages consumers to buy from their site. *Source*: Author.

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

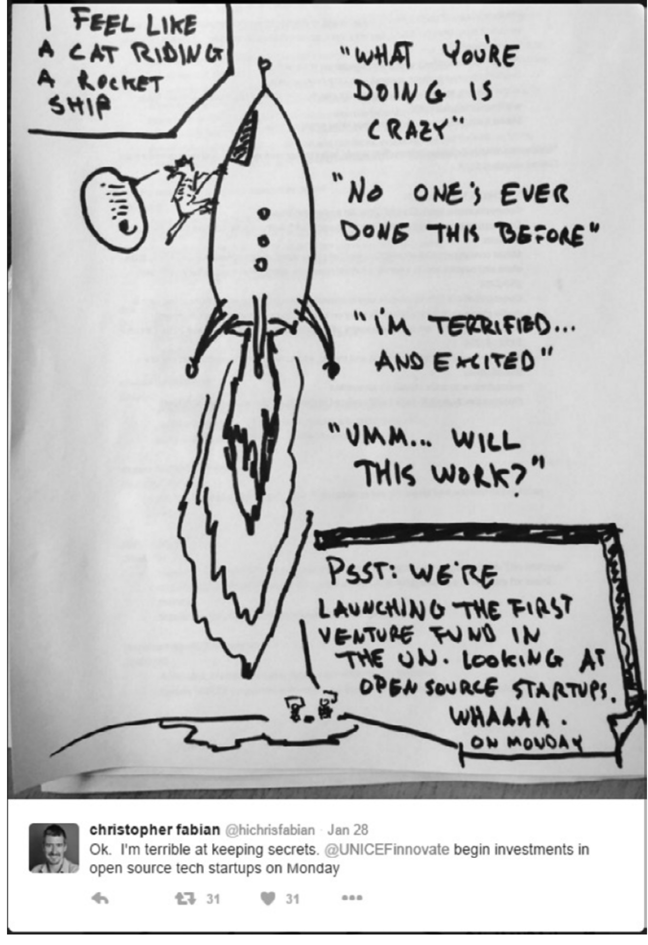

Figure 5.2
In 2016, UNICEF began its venture fund, which draws on ideas from venture capital finance to fund "open source startups." *Source*: Author.

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

operates. These processes are depoliticized for at least three reasons. First, as philanthro-capitalist practice, it invokes the ideological commitments of the contemporary neoliberal milieu. This includes the notion that the public sector should serve economic functions in areas where the private sector is known to fail; capital accumulation is the normative economic status, and the exception is the public sector (Peck and Tickell 2002). Digital humanitarians and the broader public implicitly invoke this new "common sense" when welcoming private sector involvement in digital humanitarianism. Digital humanitarianism thus runs parallel to the dominant political-economic discourses of "good practice." For instance, at the "Connecting Grassroots to Government" workshop, David Kaufman, a senior-level administrator at the Federal Emergency Management Agency (FEMA), conveyed the degree to which these practices are firmly entrenched in humanitarian imaginaries:

> Right, so take feeding people. Government doesn't feed people in this country, even in … like military and prisons and school systems, we still contract almost all that out. … So we have private sector representation inside our [disaster] operation center now, started with the retail sector, the big box stores, and now the financial services sector. … [W]hat we care about is the ability to see in real time how [private companies] are. … So that we aren't setting up shop … in the same places that they're open for business, that we're putting our efforts in places where there's a gap, and vice versa. (Woodrow Wilson Center 2012a, n.p.)

Kaufman here naturalizes the private sector's prioritization in emergency response. According to his statement, when private companies operate in a particular space, the formal response community should be removed. Using the analogy of "feeding people," Kaufman claims that the public sector is far less involved in state operations than most people assume, and that this current state is balanced. Rather than critiquing the political-economic negotiations behind this privileging of the private sector, Kaufman accepts its current status and implies it is the only possible structure. Naturalizing in this way takes trade-offs and consequences as necessary costs to be paid in a perfect political-economic organization. Kaufman further naturalizes the role of the volunteer and nonprofit sectors, again removing responsibility from the public sector and laying the groundwork for a role of digital humanitarians.

The second mechanism through which philanthro-capitalism depoliticizes digital humanitarianism is in invoking commonplace conceptions

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

of, as four interviewees explained, "the good." That is, digital humanitarians view humanitarian practices as beyond the realm of critique because they are unequivocally altruistic things to do. Critiquing digital humanitarianism is often seen to be useless at best (by not contributing to applied practices) and perverse at worst. By extension, private sector businesses are guarded from critique by participating in these practices that exemplify "caring" standpoints on global issues.[10] Remaining unanswered by the businesses and by academic research is the question of why the private sector would involve itself in philanthropy, particularly around development and humanitarianism. A prominent reason for doing so is that such activities not only provide new spaces for capital accumulation, but also bolster companies' "images" and thus rely on an affective economy. By exuding a caring, cosmopolitan corporate persona, these companies are able to persuade consumers to purchase their products, while cultivating in the consumers feelings of altruism and global citizenry. Consumption here appends an affective stimulus onto an exchange, such that consumers purchase not only a commodity but also an affective experience.

Third, digital humanitarianism is depoliticized because it is seen as an innovation that improves humanitarian response. Digital humanitarians have successfully marketed their work as innovative and potentially revolutionary, a trope taken on by some in the formal humanitarian sector as well. This view of digital humanitarianism as an innovation contributing to altruistic ends is another justification for it to be beyond the realm of critique. While such "innovations" most often occur outside the context of an emergency, emergency imaginaries influence how people conceptualize critique in relation to innovation. To explain, Scarry (2011) argues that, despite high levels of thinking that happen in emergencies, they are seen to necessitate postponing thinking in favor of acting.

Philanthro-capitalism within digital humanitarianism produces inequalities (i.e., whose knowledge is seen to matter, which crises and needs are addressed, etc.) as a byproduct of the different logics through which privatized humanitarianism operates. Capitalist enterprises are driven by the imperative to accumulate capital, which privileges logics such as speed, production/consumption, competition, and privatization of public assets (Harvey 1982). Publicly traded companies are accountable to shareholders to increase profit. In contrast, humanitarianism's primary motive is claimed to be to decrease suffering (Weizman 2012). Weizman and Manfredi (2013)

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

argue that this motivation privileges "saving lives," human rights, and mitigating violence. Private sector incursion into digital humanitarianism shifts imperatives from decreasing suffering to accumulating capital, constituting a new form of neoliberalized humanitarianism.

Conclusion

In this chapter, I have built on conversations around philanthro-capitalism and digital humanitarianism to argue that they are dual constituencies of the same broad processes. I argue that philanthro-capitalism signals shifting relationships between the state and the private sector, enabled by digital humanitarian technologies. Humanitarian agencies see digital humanitarian technology, and its underpinning philanthro-capitalist drives, as the innovation that allows humanitarian agencies to continue operations in the climate of neoliberal reforms. This has the effect of drawing on and fostering the rationalities and logics of capitalist imperatives. Philanthro-capitalism helps depoliticize digital humanitarianism because it appeals to an inherent "good" of charitable work, without attention to its consequences and drawbacks.

These processes have strong implications for economies at the global margins. What I have outlined above is the process of knowledge becoming captured, enclosed, and commodified to identify new sources of capital accumulation (Perelman 2004). More precisely, digital humanitarianism appropriates affected communities' knowledge as data in its new practices and approaches. In so doing, while affected communities might experience some benefit from strengthened assistance, the ultimate benefactors are private for-profit companies. These companies bolster their image while accumulating capital and improving their symbolic societal power (McGoey 2015). Because capitalist processes produce poverty and thus the conditions for philanthropy itself, philanthropy has been called a "protective layer for capitalism" (Roelofs 1995, 16). These processes have implications for the types of crises recognized and addressed, yet more research is needed to see what the precise effects are.

Most importantly, the broad contours of these processes shape how crises, people, and knowledge are conceptualized, represented, and captured as data. They produce new struggles over the purposes to which digital humanitarianism will be put as well as over control of the resulting

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

platforms and datasets. I have charted the sociotechnical terrain of these struggles as they present in political-economic reforms. Digital humanitarianism facilitates the emergence of philanthro-capitalism and, by extension, new waves of neoliberalism.

Notes

1. Sections of this manuscript have been adapted from my unpublished doctoral dissertation (Burns 2015a).

2. In this chapter, I often use the term "humanitarianism" to describe processes, institutions, and imperatives many might associate more with emergency management, disaster relief, and international development. While each of these can be distinguished in concept, practice, and associated research agenda, they are fundamentally "deeply interlocked regimes of knowledge, power, and morality" (Burns 2015a, 25). Each can be understood as a set of sociopolitical projects aimed at establishing and normalizing relations that prioritize power and knowledge from the Global North, while invoking a moral economy of intervention (Calhoun 2004; Lawson 2007; Fassin 2012; Weizman 2012).

3. Digital spatial technologies are those that use geographic location, such as Google Maps, geolocated Tweets, and Facebook check-ins.

4. "Improving Lives," TOMS website, accessed October 29, 2018, http://www.toms.ca/improving-lives.

5. By "assemblage" here I mean that technologies always entail social bits: they are designed to address social problems, they produce knowledge to be used socially, and so on. This is a very important distinction from understanding technology as merely a "tool." Tools are politically and socially neutral on their own but are used for social and political ends; sociotechnological assemblages contain political and social imperatives and potentials. They have some agency.

6. More broadly, knowledge produced about emergencies is itself contested, limited, and proliferated by powerful people and institutions and is thus socially constitutive (Calhoun 2004). Digital technologies are not deterministic in their capture and representation of emergency-related knowledge; they may have unintended impacts, be repurposed, and be uniquely adopted in context (Pinch and Bijker 1987).

7. This tendency to turn crisis into capital accumulation opportunities is not entirely new: Klein (2007) argued that the "shock" of crisis is leveraged as a political tool to push privatization. The new phenomenon here is how humanitarian crises and emergencies have become *central* to business models, simultaneously drawing on the moral economy of "helping others" with a purchase.

8. See also Leszczynski (2012).

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

9. Google.org is, importantly, Google's *for-profit* philanthropic wing. Google.org also manages a nonprofit organization, the Google Foundation, as part of its portfolio (Boss 2010), which does not seem to have changed with Google's recent placement under the Alphabet structure.

10. In other words, paradoxically, digital humanitarian philanthro-capitalism is depoliticized in the process of private businesses deciding on a particular political standpoint. These standpoints usually are popular and avoid contentious topics.

References

Acharya, Sarmistha. 2016. Unicef to Invest in Technology Startups to Help Children. International Business Times. February 1. http://www.ibtimes.co.uk/unicef-invest-technology-start-ups-help-children-1541146.

Adams, Vincanne. 2013. *Markets of Sorrow, Labors of Faith: New Orleans in the Wake of Katrina*. Durham, NC: Duke University Press.

Barnes, Trevor. 2013. Big Data, Little History. *Dialogues in Human Geography* 3:297–302.

Bishop, M., and M. Green. 2008. *Philanthrocapitalism: How the Rich Can Save the World*. New York: Bloomsbury Press.

Boss, Suzie. 2010. Do No Evil. *Stanford Social Innovation Review*. http://ssir.org/articles/entry/do_no_evil.

Brandusescu, Anna, Renee Sieber, and Sylvie Jochems. 2015. Confronting the Hype: The Use of Crisis Mapping for Community Development. *Convergence* 22 (6): 616–632. First published online May 18, 2015. doi:10.1177/1354856515584320.

Burawoy, Michael. 1998. The Extended Case Method. *Sociological Theory* 16 (1): 4–33.

Burns, Ryan. 2014. Moments of Closure in the Knowledge Politics of Digital Humanitarianism. *Geoforum* 53:51–62.

Burns, Ryan. 2015a. Digital Humanitarianism and the Geospatial Web: Emerging Modes of Mapping and the Transformation of Humanitarian Practices. PhD diss., University of Washington, Seattle. https://digital.lib.washington.edu:443/researchworks/handle/1773/33947.

Burns, Ryan. 2015b. Rethinking Big Data in Digital Humanitarianism: Practices, Epistemologies, and Social Relations. *GeoJournal* 80 (4): 477–490.

Burns, Ryan, and Lea Shanley. 2013. *Connecting Grassroots to Government for Disaster Management: Workshop Report*. Washington, DC: Woodrow Wilson International Center for Scholars; http://www.scribd.com/doc/165813847/Connecting-Grassroots-to-Government-for-Disaster-Management-Workshop-Summary.

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

Calhoun, Craig. 2004. A World of Emergencies: Fear, Intervention, and the Limits of the Cosmopolitan Order. *Canadian Review of Sociology and Anthropology* 41 (4): 373–395.

Carbonnier, Gilles. 2006. Privatisation and Outsourcing in Wartime: The Humanitarian Challenges. *Disasters* 30 (4): 402–416.

Crawford, Kate, and Megan Finn. 2015. The Limits of Crisis Data: Analytical and Ethical Challenges of Using Social and Mobile Data to Understand Disasters. *GeoJournal* 80 (4): 491–502.

Crowley, John, and Jennifer Chan. 2011. *Disaster Relief 2.0: The Future of Information Sharing in Humanitarian Emergencies*. UN Foundation and Vodafone Foundation Technology Partnership. http://www.globalproblems-globalsolutions-files.org/gpgs_files/pdf/2011/DisasterResponse.pdf.

Cupples, Julie. 2015. Coloniality, Masculinity, and Big Data Economies. *Geography/development/culture/media* (blog). May 11, 2015. https://juliecupples.wordpress.com/2015/05/11/coloniality-masculinity-and-big-data-economies/.

Dalton, Craig. 2015. For Fun and Profit: The Limits and Possibilities of Google-Maps-Based Geoweb Applications. *Environment & Planning A* 47 (5): 1029–1046. doi:10.1177/0308518X15592302.

Dalton, Craig, and Jim Thatcher. 2014. What Does a Critical Data Studies Look Like, and Why Do We Care? Seven Points for a Critical Approach to "Big Data." *Society and Space Open Site*. http://societyandspace.org/2014/05/12/what-does-a-critical-data-studies-look-like-and-why-do-we-care-craig-dalton-and-jim-thatcher/.

Duffield, Mark. 2016. The Resilience of the Ruins: Towards a Critique of Digital Humanitarianism. *Resilience* 4 (3): 147–165.

Elwood, Sarah. 2015. Still Deconstructing the Map: Microfinance Mapping and the Visual Politics of Intimate Abstraction. *Cartographica: The International Journal for Geographic Information and Geovisualization* 50 (1): 45–49. doi:10.3138/carto.50.1.09.

Essex, Jamey. 2013. *Development, Security, and Aid*. Athens: University of Georgia Press.

Fassin, Didier. 2012. *Humanitarian Reason: A Moral History of the Present*. Berkeley: University of California Press.

Finn, Megan, and Elisa Oreglia. 2016. A Fundamentally Confused Document: Situation Reports and the Work of Producing Humanitarian Information. In *Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work and Social Computing*, 1349–1362. New York: ACM. http://www.ercolino.eu/docs/Oreglia_Pub_Fundamentally%20Confused%20Document%202016_AD.pdf.

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

Fridell, G., and M. Konings. 2013. Introduction: Neoliberal Capitalism as the Age of Icons. In *Age of Icons: Exploring Philanthrocapitalism in the Contemporary World*, edited by G. Fridell and M. Konings, 3–25. Toronto: University of Toronto Press.

Goodchild, Michael, and J. Alan Glennon. 2010. Crowdsourcing Geographic Information for Disaster Response: A Research Frontier. *International Journal of Digital Earth* 3 (3): 231–241.

Graham, Mark. 2010. Neogeography and the Palimpsests of Place: Web 2.0 and the Construction of a Virtual Earth. *Tijdschrift voor Economische en Sociale Geografie* 101 (4): 422–436.

Graham, Stephen. 2005. Software-Sorted Geographies. *Progress in Human Geography* 29 (5): 562.

Hall, Stuart, Doreen Massey, and M. Rustin. 2013. After Neoliberalism: Analysing the Present. In *After Neoliberalism? The Kilburn Manifesto*, edited by Stuart Hall, Doreen Massey and M. Rustin, 3–19. London: Soundings. https://www.lwbooks.co.uk/sites/default/files/00_manifestoframingstatement.pdf.

Harvey, David. 1982. *The Limits to Capital*. Chicago: University of Chicago Press.

Hay, Iain. 2013. Questioning Generosity in the Golden Age of Philanthropy Towards Critical Geographies of Super-Philanthropy. *Progress in Human Geography* 38 (5): 635–653. First published online September 2, 2013. doi:10.1177/0309132513500893.

Jacobsen, Katja. 2015. *The Politics of Humanitarian Technology: Good Intentions, Unintended Consequences and Insecurity*. London: Routledge.

Jenkins, G. 2011. Who's Afraid of Philanthrocapitalism? *Case Western Reserve Law Review* 61 (3): 1–69.

Kitchin, Rob. 2014. Big Data, New Epistemologies and Paradigm Shifts. *Big Data and Society* 1:1–12.

Kitchin, Rob, and Martin Dodge. 2012. *Code/Space: Software and Everyday Life*. Cambridge, MA: MIT Press.

Klein, Naomi. 2007. *The Shock Doctrine: The Rise of Disaster Capitalism*. New York: Picador.

Larner, W. 2003. Neoliberalism? *Environment and Planning D: Society & Space* 21 (5): 509–512.

Lawson, Victoria. 2007. *Making Development Geography*. Oxford: Oxford University Press.

Leszczynski, Agnieszka. 2012. Situating the Geoweb in Political Economy. *Progress in Human Geography* 36 (1): 72–89.

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

Liu, Sophia B., and Leysia Palen. 2010. The New Cartographers: Crisis Map Mashups and the Emergence of Neogeographic Practice. *Cartography and Geographic Information Science* 37 (1): 69–90.

Loewenstein, Antony. 2015. *Disaster Capitalism: Making a Killing Out of Catastrophe*. London: Verso.

Maurer, Bill. 2015. Data-Mining for Development? Poverty, Payment, and Platform. In *Territories of Poverty: Rethinking North and South*, edited by Ananya Roy and Emma Shaw Crane, 126–143. Athens: University of Georgia Press.

McGoey, Linsey. 2015. *No Such Thing as a Free Gift: The Gates Foundation and the Price of Philanthropy*. New York: Verso.

Meier, Patrick. 2012. Crisis Mapping in Action: How Open Source Software and Global Volunteer Networks Are Changing the World, One Map at a Time. *Journal of Map & Geography Libraries* 8 (2): 89–100.

Meier, Patrick. 2015. *Digital Humanitarians: How Big Data Is Changing the Face of Humanitarian Response*. Boca Raton, FL: CRC Press.

Meier, Patrick, and Robert Munro. 2010. The Unprecedented Role of SMS in Disaster Response: Learning from Haiti. *SAIS Review* 30 (2): 91–103.

Mitchell, Katharyne. 2016. "Factivism": A New Configuration of Humanitarian Reason. *Geopolitics* 22 (1): 110–128. doi:10.1080/14650045.2016.1185606.

Mitchell, Katharyne, and Matthew Sparke. 2016. The New Washington Consensus: Millennial Philanthropy and the Making of Global Market Subjects. *Antipode* 48 (3): 724–749.

Morvaridi, B. 2012. Capitalist Philanthropy and Hegemonic Partnerships. *Third World Quarterly* 33 (7): 1191–1210.

Norris, John. 2012. Hired Gun Fight. *Foreign Policy*, July 18, 2012. http://foreignpolicy.com/2012/07/18/hired-gun-fight/.

Peck, Jamie. 2006. Response: Countering Neoliberalism. *Urban Geography* 27 (8): 729–733.

Peck, Jamie, and Adam Tickell. 2002. Neoliberalizing Space. *Antipode* 34 (3): 380–404.

Perelman, Michael. 2004. *Steal This Idea: Intellectual Property and the Corporate Confiscation of Creativity*. New York: Palgrave Macmillan.

Pinch, Trevor, and Wiebe Bijker. 1987. The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other. In *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, edited by Wiebe Bijker, Thomas Hughes, and Trevor Pinch, 11–44. Cambridge, MA: MIT Press.

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

Read, Róisín, Bertrand Taithe, and Roger Mac Ginty. 2016. Data Hubris? Humanitarian Information Systems and the Mirage of Technology. *Third World Quarterly* 37 (8): 1314–1331. doi:10.1080/01436597.2015.1136208.

Roberts, Susan. 2014. Development Capital: USAID and the Rise of Development Contractors. *Annals of the Association of American Geographers* 104 (5): 1030–1051.

Robinson, John, Jim Maddock, and Kate Starbird. 2015. Examining the Role of Human and Technical Infrastructure during Emergency Response. In *Proceedings of the ISCRAM 2015 Conference*, edited by Leysia Palen, Monika Büscher, T. Comes, and A. Hughes, 311–320. Cham: Springer.

Roche, Stéphane, E. Propeck-Zimmermann, and B. Mericskay. 2011. GeoWeb and Crisis Management: Issues and Perspectives of Volunteered Geographic Information. *GeoJournal* 78:1–20.

Roelofs, J. 1995. The Third Sector as a Protective Layer for Capitalism. *Monthly Review* 47 (4): 16–25.

Roy, Ananya. 2010. *Poverty Capital*. London: Taylor and Francis.

Sandvik, Kristin, M. Jumbert, J. Karlsrud, and M. Kaufmann. 2014. Humanitarian Technology: A Critical Research Agenda. *International Review of the Red Cross* 86 (893): 219–242.

Sandvik, Kristin, and Kjersti Lohne. 2014. The Rise of the Humanitarian Drone: Giving Content to an Emerging Concept. *Millennium: Journal of International Studies* 43 (1): 145–164.

Scarry, Elaine. 2011. *Thinking in an Emergency*. New York: Norton.

Thatcher, Jim. 2013. Avoiding the Ghetto through Hope and Fear: An Analysis of Immanent Technology Using Ideal Types. *GeoJournal* 78 (6): 967–980.

Thatcher, Jim, David O'Sullivan, and Dillon Mahmoudi. 2016. Data Colonialism through Accumulation by Dispossession: New Metaphors for Daily Data. *Environment and Planning D: Society & Space* 34 (6): 990–1006. doi:10.1177/0263775816633195.

Weizman, Eyal. 2012. *The Least of All Possible Evils: Humanitarian Violence from Arendt to Gaza*. New York: Verso Books.

Weizman, Eyal, and Zachary Manfredi. 2013. "From Figure to Ground": A Conversation with Eyal Weizman on the Politics of the Humanitarian Present. Qui Parle. *Critical Humanities and Social Sciences* 22 (1): 167–192.

Woodrow Wilson Center. 2012a. Legal and Policy Issues. Video of panel uploaded by the Woodrow Wilson Center, October 24, 2012. https://www.youtube.com/watch?v=apEMNJFnBEM&feature=youtu.be.

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

Woodrow Wilson Center. 2012b. Research Challenges. Video of panel uploaded by the Woodrow Wilson Center, November 2, 2012. https://www.youtube.com/watch?v=uTIT3mkQhew&feature=youtu.be.

Žižek, Slavoj. 2009. *First as Tragedy, Then as Farce*. New York: Verso.

Žižek, Slavoj. 2010. First as Tragedy, Then as Farce. Video of talk uploaded by The RSA, March 10, 2010. http://www.youtube.com/watch?v=cvakA-DF6Hc&feature=youtube_gdata_player.

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a portion of the eBook at doi:10.7551/mitpress/10890.001.0001

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

This is a section of doi:10.7551/mitpress/10890.001.0001

Digital Economies at Global Margins

Edited by: Mark Graham

Citation:

Digital Economies at Global Margins
Edited by: Mark Graham
DOI: 10.7551/mitpress/10890.001.0001
ISBN (electronic): 9780262349482
Publisher: The MIT Press
Published: 2019

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024

MIT Press Direct

© 2019 Contributors

This work is licensed under a Creative Commons Attribution 4.0 (CC-BY 4.0) International License.

Published by the MIT Press. MIT Press books may be purchased at special quantity discounts for business or sales promotional use. For information, please email special_sales@mitpress.mit.edu.

A copublication with
International Development Research Centre
PO Box 8500
Ottawa, ON K1G 3H9
Canada
www.idrc.ca/ info@idrc.ca

The research presented in this publication was carried out with the financial assistance of Canada's International Development Research Centre. The views expressed herein do not necessarily represent those of IDRC or its Board of Governors.

ISBN 978-1-55250-600-4 (IDRC e-book)

This book was set in ITC Stone Sans Std and ITC Stone Serif Std by Toppan Best-set Premedia Limited. Printed and bound in the United States of America.

Library of Congress Cataloging-in-Publication Data

Names: Graham, Mark, 1980- editor.
Title: Digital economies at global margins / edited by Mark Graham.
Description: Cambridge, MA : MIT Press, [2018] | Includes bibliographical
references and index.
Identifiers: LCCN 2018010198 | ISBN 9780262535892 (pbk. : alk. paper)
Subjects: LCSH: Small business--Technological innovations. | Electronic commerce.
| Marginality, Social. | Social marketing.
Classification: LCC HD2341 .D54 2018 | DDC 384.309172/4--dc23 LC record
available at https://lccn.loc.gov/2018010198

10 9 8 7 6 5 4 3 2 1

Downloaded from http://direct.mit.edu/books/oa-edited-volume/chapter-pdf/2261271/9780262349482_ccc.pdf by guest on 12 June 2024