1 Introduction

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In a rural Ugandan town, a day's drive from the nearest international airport, a few abandoned shipping containers sat beneath a communication mast. On one side of the mast was the main road linking the region to the rest of the country. You could almost miss the shipping containers from the road, hidden as they were behind a small kiosk selling snacks, sodas, and mobile phone credit. On the other side lay a dry playing field. A few boys kicked a ball around, and a hen and her chicks scurried to get out of the way.

This might seem an unlikely location for work that goes into developing the next generation of consumer-facing technologies. But that is exactly what was happening there. In 2012, a foreign-owned company put a few computers into shipping containers, powered them with generators, and connected them to the Internet wirelessly. Workers were then hired to train machine learning systems, run by companies in the Americas, Europe, and Asia, by classifying and annotating images and videos (Anwar and Graham 2020).

By 2017, when one of us visited, the demand for such work had increased so much that the work had been moved out of the shipping containers and into a much larger office space (see figure 1.1). Here, 300 people worked in shifts to classify data for foreign clients. On most of the workers' screens were street-level photographs of North American suburbs, and workers were carefully drawing the outlines of everything in the images in front of them: cars, pavement, buildings—even birds!

When asked to describe what they were doing, most workers responded—quite rightly—that they were annotating images. But when pressed for more detail, *why* the client wanted these images annotated or what they might be doing with them, the response was simply "They don't tell me; they just want lots of tagged images."

These are jobs that look as if they can be done from literally anywhere—in Antarctica or on a floating barge—apart from one key factor: the requirement for workers who are willing and able to carry out that labor. It is this tension that *Digital Work in the Planetary Market* explores. The digital revolution, coupled with widespread Internet

Figure 1.1
An AI training center in rural East Africa.
Source: Anwar and Graham (2020).

connectivity, means that work is becoming ever more connected, and the global production networks[1] that link workers and clients together are tapping into ever more people, places, and processes worldwide. In this book, we have sought to bring together a diverse range of perspectives in order to understand this process and what it means for work and workers today.

Our entry point is the fact that an increasing amount of human activity, and with it an increasing amount of work, is digitally mediated. Even the most intimate and physically present of human exchanges—seeking medical advice, the dealing of drugs, sexual intimacy—can generate all manner of digital data, faithfully captured by the devices that are never far from us today. That data, then, becomes the raw material for vast amounts and flows of human labor that transcend national boundaries—that have apparently escaped the stickiness of geography, have become untethered from place. From call center workers in Newcastle, to on-demand essay writers in Nairobi, to personal assistants in Nashville, to microworkers classifying images in New Delhi, workers are increasingly enrolled into systems that analyze, transform, and build other services and products with, and from, digital data.

Many of the world's most valuable companies rely on planetary networks of digital work that underpin their products and services. These transnational connections can lead to some unexpected outcomes. For example, third-party contractors around the world transcribing audio for Apple to improve the automated speech assistant Siri have overheard confidential medical information, drug deals, and recordings of American

couples having sex—all faithfully recorded by smart devices like the HomePod and Apple Watch (Hern 2019). Amazon's contractors in Costa Rica, India, and Romania are paid to structure, annotate, and organize conversations captured by Alexa to train Amazon's speech recognition systems (Day, Turner, and Drozdiak 2019). Google contractors label recordings of Google Assistant (Wong 2019), and Facebook uses Indian contractors to transcribe the private audio chats of users (Frier 2019). For some commentators, these revelations represent an extraordinary privacy scandal. However, these cases also neatly demonstrate that work and the networks that extract value from it are increasingly embedded into planetary systems. As ever more work is commodified and traded beyond local labor markets, we want to focus in this book on those systems of economic production and consumption that purport to transcend—or at least pay little attention to—the locations in which work is actually done.

For most of human history, economic production and transactions have required a certain amount of both synchronicity and proximity (Graham and Anwar 2018). Proximity afforded the synchronicity that was needed for the exchange of money; the exchange of goods; offers to buy and sell labor; and the exchange of both codified and tacit knowledge about the goods being exchanged, and the parties exchanging them (Fevre 1992). While labor markets did not necessarily require a *fixed* time and place for exchange, they did need *some sort of* time and place—if only because users of any market need to know when and where exchange can happen. But if work is now increasingly digital and transmittable across time and space, how does that affect the temporal and spatial nature of labor exchange?

As both transportation and communication technologies have advanced, technologies—and control of the infrastructures and systems that we build on top of them—have been used to command both time and space (Castells 2000; Harvey 2001). With each new technological revolution—from the steamship to the telegraph to the Internet—the world has shrunk. Fiber-optic cables now connect every major inhabited corner of the planet (Graham, Andersen, and Mann 2015). This command of space—through the vast infrastructures that have been overlaid onto all continents and seas (figure 1.2)—has also annihilated the temporal barriers to virtual exchange. With a few exceptions, those cables—and associated wireless networks—allow almost anyone anywhere to instantaneously connect to anyone else anywhere else to synchronously communicate via the exchange of files, data, video, and audio.

This apparent annihilation of time/space, of course, is not a new observation. In the 1990s, cyberutopians imagined that the Internet would bring into being a "cyberspace" that would allow humanity to coexist in virtual form. As John Perry Barlow famously announced at Davos in 1996, in his "Declaration of the Independence of Cyberspace":

Figure 1.2
Arrival of the first submarine fiber-optic cable into East Africa in the Kenyan coastal city of Mombasa on June 12, 2009. East Africa was the last major populated part of the planet to be connected to the planetary grid.
Source: Alamy.

"I come from Cyberspace, the new home of Mind. On behalf of the future, I ask you of the past to leave us alone. You are not welcome among us. You have no sovereignty where we gather." In this compelling vision, our material realities could be shed—simply left behind and transcended. By the first decade of the twenty-first century, however, a rather different vision of planetary unity was being advanced: not one in which everyone would be transported into the same "cyberspace," but rather one in which the world's spatial frictions would simply cease to be. Thomas L. Friedman's *The World Is Flat* (2005) perhaps best captured this imaginary of annihilated spatial frictions. Under this worldview, the planet becomes a truly level playing field in which anything can in theory be done from anywhere (Graham 2015).

What united both visions was an unrestricted extrapolation that turned a simple fact (i.e., that information and communication technologies afford widespread synchronous connectivity) into metaphors in order to make rather bombastic claims: of the death of distance, of a flat world, and of a utopian virtual cyberspace existing somewhere beyond the realm of the real. However, those visions—while obviously neat and compelling—belie the myriad ways that place, proximity, and positionality still matter.

Indeed, geographers responded to these claims with full force—producing article after article arguing that despite this wiring of the world, "geography still matters!" (Morgan 2004; Clare 2013). As often happens in the wake of these sorts of claims about technology when they suddenly chime with the public's imagination, the amount of energy taken to refute exaggerated claims about "the end of geography" was much greater than the energy taken to produce them. But even as scholars worked to critique and take apart overblown claims about the end of geography and the death of distance, the central ideas within those assertions were taken up even more broadly in talk of the "global." Whether it be "globalization," the "global market," or even the "global village," the *global* references something that is somewhere else from us but also nowhere in particular—a spaceless place that is at once everywhere and nowhere.

Our goal in bringing together this book—and the many different perspectives it contains—is to move beyond the "death of distance," the "world is flat," and the "geography still matters" propositions that have long shaped globalization discourses. We instead use the term *planetary* to return to a fundamentally different understanding of a worldwide market: a world of interconnections. Place, proximity, and positionalities will never be fully transcended—even digital data must be transmitted over physical infrastructure and will reside in a physical server, which will sit in a particular place and jurisdiction—but the planetary scale of connectivity means that they now matter in profoundly different ways. We wish to emphasize the globe-spanning nature of contemporary networks without resorting to an understanding of "the global" as a place beyond space. This framing forces us not to imagine away the always-existing economic geographies of work but to ask empirical, theoretical, and normative questions about how they will shape and be shaped by planetary-scale interactions and transactions.

From that starting point, this book ties together two core lines of inquiry. First, it attempts to understand how work itself is transforming within a planetary market, asking what it means to experience work in a digital production network, how artificial intelligence (AI) changes the spatial embeddedness of work processes, and what possibilities workers—when they sit in opaque networks of production—have to decommodify and improve the conditions under which they work. Second, the book seeks to understand and dissect the wider systems, networks, and processes that shape and give shape to digital work in the planetary market. It asks how transnational networks of machines and workers fuse together in value chains; how those networks and actors leverage, shape, and are shaped by economic geographies; how the relative materiality, immateriality, embeddedness, and disembeddedness of digital work influence actors who both extract value from it and perform it; and how the various forms of governance and unevenness within these planetary networks might be theorized.

Of course, to chase the history of planetary thinking in the social sciences is to chase a ghost. The very term *planetary thinking* is contested, ubiquitous, and difficult to grasp. In this chapter, it is therefore not our ambition to provide an etymological or intellectual history of planetary thinking in the social sciences. Rather we deploy the concept of the planetary market to shed light on networks of work that are characterized by planetary reach, by conjunctural geographies, by fragmentation and clustering, by platforms of commodification, and by planetary competition and resistance. We expand on each of these characteristics below.

Planetary Reach

At the time of writing in early 2021, over five billion people are connected to the Internet—almost two-thirds of the world's population.[2] Outside of North Korea, there are no cities or large towns in which it is difficult to obtain a high-speed Internet connection. In theory, one can connect from just about anywhere on Earth to the worldwide network. As a result, an increasing amount of the world's work is digitally transmitted over those cables; indeed, in many industries, production, coordination, and delivery can all be conducted digitally. Connectivity, for most uses, now potentially ceases to be a factor that determines the geography of production—nowhere is now off the map of connectivity.

From the 1980s onward, the liberalization of international trade and advances in international shipping and telecommunications networks ushered in an increasingly internationalized interconnectedness of economic activity, along with intensifying competition. The changes in the nature of global supply chains and employment that started during this time are still happening today. On a corporate level, firms began to restructure their activities, offshoring and outsourcing peripheral functions to take advantage of geographic variation in skills, costs, and institutional environments and increase flexibility and competitiveness. On a worldwide level, this corporate restructuring has led to the emergence of new international divisions of labor, in which not just certain industries but certain functions within industries have concentrated in specific locations. Perhaps most noticeably, lead firms in high-labor-cost countries have outsourced and offshored back-office work into massive service centers located in lower-labor-cost countries, including India and the Philippines (Peck 2017).

This book asks how today's digital geographies will shape the world of work to come, similarly to how the geography of connectivity in the 1980s and 1990s profoundly shaped the economic geographies of outsourcing and offshoring. For example, in chapter 7, Brett Neilson explores Chinese digital behemoth Alibaba's creation of a so-called Digital

Free Trade Zone in Malaysia. He argues that, far from being simple and deterministic, the relationship between geopolitical forces, warehousing practices, and labor control is complicated and contingent, defying simplistic explanations based in the China-US economic rivalry. In chapter 9, Hannah Johnston similarly argues that geopolitical ramifications—in particular, recent US sanctions against the Venezuelan state—have created a unique context for digital work. While digital labor platforms[3] have provided many Venezuelans with a lifeline during the country's ongoing economic collapse, Johnston underlines the ways in which crucial digital infrastructures like payment systems are disrupted by geopolitical conflicts. Venezuelans may be able to secure platform work to supplement their incomes, but whether they can successfully negotiate economic sanctions to get paid for that work is another matter entirely. In short, these chapters point to the importance of geopolitics, alongside simple connectivity and labor supply, in shaping digital work in the planetary market.

As ever more workers and more places get hooked into this market, capital finds ever more nodes through which to seek surplus value. This fact has two implications. First, digital and digitally mediated work can be done from an increasing number of places. That much digital work requires relatively little fixed capital and can be transmitted easily, creates the preconditions for a worldwide reconstruction of economic networks of production and consumption. Second, and relatedly, for most work that does not require the creation of a material product, physical distance can increase significantly between workers, bosses, and consumers. These features of the planetary market shape the transformation of work. In chapter 11, James Steinhoff considers the case of data science workers to argue that while the data science labor force is globally distributed, it is "predominantly tied to powerful firms concentrated in specific locales," most notably the US and China. Drawing on the concept of labor power, Steinhoff describes the proletarianization of data science work—that is, the reduction of its scarcity and the devaluation of its content—including the role of digital platforms in transforming tasks and networks.

That said, the almost-universal nature of potential connectivity by no means translates into actual affordances or practices. There are, and will always be, countless unconnected and uncommodified alternative economies (Gibson-Graham 2006; Graham 2019a). Yet as the reach of capital becomes increasingly untethered and globe spanning, it is clear that regulatory frameworks and supranational organizations must adapt to this new reality. Referring to the early origins of the International Labour Organization (ILO) as a system of international labor regulation, Janine Berg argues in chapter 16 that technological advances have "exposed the limits of labor regulation bounded by physical jurisdictions and conceived for the production of tangible products." As a

result of the mismatch between newly unbounded networks of work and state-based regulatory structures, she makes the case for a new international governance system for digital work in the planetary market.

Conjunctural Geographies

There is a recent history of seeing digitally mediated work and production as existing in "the cloud." The flows of information within the cloud seem to be able to transcend physical laws, geographic constraints, and regulatory points of leverage (Hu 2015; Amoore 2020). Clouds normally float above our heads; they are intangible yet ubiquitous. The vision of clouds (or a "cyberspace") that is immaterial and disembedded from the "real world" or physical space has shaped much of today's digital imaginaries (Graham 2019b). The digital is seen and framed as being somewhere else. Peck and Phillips (2021, 82), for instance, in their dissection of how platform capitalism operates, note that "the matrix-like capacities of platforms mean that they can seem to be everywhere but at the same time remain placeless—their preferred address, appropriately enough, being 'the cloud.'"

Here we are inspired by the notion of "power-geometries" developed by Doreen Massey (1991; 2005). Specifically, this means not thinking about an online/offline dualism and not thinking of geography as something that can be flattened or shrunk. Space can be imagined instead as "articulated moments in networks of social relations and understandings, but where a large proportion of those relations, experiences and understandings are constructed on a far larger scale than what we happen to define for the moment as the place itself, whether that be a street, or a region or even a continent" (Massey 1991, 28). This notion of space scrutinizes how the relative mobility and connectivity of some people and places entrenches the marginalization of others. The planetary market is therefore not limited to a fixed point in the geometry of Euclidean space—the idea that space must be conceptualized in relation to discrete physical territories and geographic coordinates in which clearly identifiable positions can be mapped on a canvas. As Benjamin Bratton (2016, xvii) puts it, "Maps of horizontal global space can't account for all the overlapping layers that create a thickened vertical jurisdictional complexity, or how we already use them to design and govern our worlds." In other words, we need to come to grips with new ways of conceptualizing space, place, distance, proximity, and connectivity—taking into account that work can be transmitted over time and space in digitally mediated ways.

Several chapters of the book present and deploy novel ways of conceptualizing space, place, distance, proximity, and connectivity in the planetary market. In chapter 8,

Florian A. Schmidt sheds light on the relationship between the production of autonomous vehicles and the increasing demand for human-labeled training data for AI systems. Schmidt describes the specialized platforms that have emerged to fill the demand for training data processing, making use of spatially dispersed workforces of data annotators and "experimenting with various stacking orders of human labor—AI support and control systems, subautomation, and suboutsourcing." In chapter 15, Matthew Hockenberry focuses on the role of the mobile phone in contemporary logistical networks. Using the last-mile service Amazon Flex as a case study, he suggests that the mobile phone can be described as an interface between local sites of distribution and massive software systems of planetary production. This relationship, he shows, is key to understanding power relations in the gig economy and its modes of digitally mediated managerial control.

By thinking about connectivities as part of translocal power-geometries rather than disembedded online interactions, we would argue that the market through which labor power and services are traded is characterized by "conjunctural geographies" (Graham 2020)—that is, markets in which economic actors are simultaneously embedded into and disembedded from local contexts. Based on fieldwork in an e-commerce village in East China's Shandong Province, Lin Zhang shows in chapter 2 the distinct ways in which local handicraft-making traditions are intersecting with planetary systems of capitalist production—notably, Alibaba's e-commerce platform Taobao.com. Zhang develops the notion of "platformized family production" and examines its myriad contradictions in the Chinese countryside. In so doing, she "counterbalances digital labor studies' Western centrism by methodizing (rather than objectifying) China."

The digital, in each of these cases, is both there and not there, embedded and disembedded, material and immaterial. Far from being purely immaterial or virtual, the digital is constituted and sustained by human labor with respect to cables, pipelines, satellites, servers, the extraction of metals and minerals, maintenance, and more. In chapter 19, Joana Moll and Jara Rocha, using the everyday act of purchasing a book on Amazon as an example, argue that the implications of this process are far from mundane. Rather, a few clicks set in motion a massive and energetically costly machinery. Indeed, several chapters articulate how work and workers can be both empowered and disempowered by their reliance on firms, platforms, infrastructures, and border-crossing networks that are opaque, ephemeral, and transient and that allow for interactions at the speed of light but that constitute networks whose edges and nodes are placed *somewhere* and never nowhere. The ability to command and deploy those affordances is far from evenly distributed, and one of the primary contributions of this book will be to show how powerful actors used control over conjunctural geographies in order to further entrench their positions in the planetary market.

Fragmentation and Clustering

Even in a hyperconnected world dominated by platforms, economic geographies remain heterogeneous, clustered, and fragmented. Just because information-based work *can*, in theory, be requested and conducted from anywhere does not mean that it *will*. The planetary market facilitates a confluence that can transcend the spatial boundaries that have historically constrained both employers and workers, but the economic activities within it remain shaped and characterized by multiscalar and asymmetrical technological, political, social, cultural, and institutional factors. And the power to control, command, and obfuscate these inherently spatial infrastructures to annihilate time and space is unevenly distributed and experienced. While the planetary networks within which most digital work is embedded might seem opaque and unknowable to us, a key goal of bringing this book together is to provide a way in by giving an indication about key sites of both production and consumption.

In recent years, a number of scholars have highlighted that the interlaced processes of physical and cognitive human labor in various parts of the planet are key features of today's production networks, blurring the boundaries between digital, physical, and biological layers of extraction and exploitation (Mezzadra and Neilson 2017; Crawford 2021). Amazon's Echo smart speakers, for instance, require the extraction of rare earth minerals like neodymium. At the same time, the artificial neural networks of Amazon's virtual speech assistant, Alexa, rely on outsourced workers' cognitive labor in annotating large-scale training datasets.[4] These highly standardized and menial tasks are often performed by outsourced workers, as described by Paola Tubaro and Antonio Casilli in chapter 10. For Tubaro and Casilli, privacy violations and labor arbitrage are two sides of the same coin; they contend that the responsibilities of subcontracted workers who listen to recordings of such devices "include much more than just transcribing and annotating conversations to help automated speech algorithms 'self-learn.'"

There are various concepts we can use to make sense of the gaps between the metaphoric promotion of contemporary digital technologies as seamless or even magical entities, and the sobering reality of their reliance on the labor of distant workers. In chapter 13, Jathan Sadowski turns our attention to how, by mystifying the real operations of AI-powered technological systems, technology companies attempt to eradicate the role of the human labor that produces such systems. As he asserts, this sleight of hand dovetails with the fact that "the desire for AI in some places supplants the rights of humans in other places." In introducing the notion of "planetary Potemkin AI," Sadowski posits that prominent instances of AI are simply artificial displays of its future potential: a shiny facade of cultural hype allowing entrepreneurs to attract venture capital by masking the inputs of human labor.

Gray and Suri (2019, 1) have called this phenomenon "the paradox of automation's last mile." In other words, as AI systems advance, they rapidly create and dismantle temporary labor markets to support new, previously unneeded human-in-the-loop tasks. Inspired by critical political economy, Ekbia and Nardi (2017, 22) deploy a neologism, *heteromation*, to describe "the extraction of economic value from low-cost or free labour in computer-mediated networks," in which they see a "new logic of capital accumulation." By introducing the notion of "fauxtomation," Taylor (2018) posits that socialist feminism's myriad insights regarding the paradoxical relationship between domestic work and technology provide potent resources for debunking warnings about full automation. As Seaver (2018, 378) aptly puts it, "If you cannot see a human in the loop, you just need to look for a bigger loop." In other words, what is destructive about the planetary market is not so much that work happens *nowhere*; it is that it *does not matter where* it takes place. Why invest in local labor markets if the next human in the loop is just a click away?

The disciplines of geography and sociology offer a range of concepts to describe systems of production that link disparate places to exploit differences and, in so doing, create highly opaque networks: global commodity chains, global value chains, global production networks—all these approaches have been developed to study the heterogeneous relationships between spatially dispersed actors. However, with digitally mediated commodities and services—including social media platforms—it is difficult to gaze backward along the chain of production because these systems are often continually unfolding and rarely fixed in nature. In chapter 5, Sana Ahmad and Martin Krzywdzinski focus on an indispensable type of such work: content moderation. Despite having attracted considerable attention in this era of social media—and all the online hate and disinformation it supports and propagates—the value chain configurations of content moderation remain opaque. Drawing on fieldwork in India, Ahmad and Krzywdzinski seek to address this research gap, shedding light on the work and lives of content moderators. At the hidden nodes of even very fragmented digital production networks, there will always be real, human workers who are producing the outputs.

Platforms of Commodification

In his 1935 essay "The Work of Art in the Age of Mechanical Reproduction," German critical theorist Walter Benjamin famously points out that paradigmatic shifts in the ways in which art is reproduced have sweeping implications for its aesthetic, sociocultural, and political perception within society. The ritualized process of technical reproduction, Benjamin writes, diminishes the aura of an artwork by depriving it of its unique aesthetic authority—its one and only existence. As a consequence of the reproducibility of art across time and space, the mechanical destruction of authenticity causes

a reconfiguration of the boundaries between private and public realms: it reshapes the flows of social life.

One does not have to sympathize with the cultural criticism of the Frankfurt School to acknowledge the relevance of Benjamin's insights for making sense of digital work in the planetary market. A key premise of this book is that many types of work have become commodified and easier to trade and govern. Ever more work is performed in and packaged into machine-readable units. The use around the world of standardized tools, files, processes, and protocols; the trading of work in the same systems, digital platforms, and networks; and the evaluation of work with common rating and reputation systems—all of this makes work identifiable, searchable, and tradable at a truly planetary scale. Fixed material infrastructures of computing, international standards, and global payment systems allow the integration into broader systems of production of work that is broken into commodifiable chunks. In a world of replicable digital infrastructures, there is no more *terra incognita*.

This is not an argument that geography no longer matters. Far from it. Digital networks of production settle precisely in the places with the most advantageous political economies. In chapter 14, Nick Srnicek addresses the question of whether AI is a centralizing technology that compounds the concentration of power and capital. He argues that "the emerging global value chain of AI is a profoundly unequal one" and, by scrutinizing the notion that data is the only major competitive advantage for a handful of Chinese and American platform companies, presents two other key drivers of monopolization: compute and labor. Srnicek's chapter usefully extends our theoretical and political horizons beyond a narrow focus on data and datafication. From this perspective, technology giants do not just *reflect* the structures of the planetary market; they *produce* the structures of this market. Given that some platform companies have reached such a gigantic scale that they now "seem to function as vital infrastructures in the world at large . . . such that living without them shackles social and cultural life" (Plantin and Punathambekar 2018, 2), it is crucial that we grasp and critically examine their political economy.

Digital production networks, through opaque and often untraceable connections, bring together workers and the objects and subjects of their work in ways that not only make proximity superfluous but also actively design against it. That said, several chapters in this book show that planetary systems work to conceal workers from each other and from other nodes in their production networks, as well as from their own local contexts. In chapter 6, Andreas Hackl addresses social enterprises that use digital labor platforms to provide work opportunities for refugees in the field of image annotation. Based on fieldwork with Syrian refugees in Lebanon, Hackl critically assesses the

promise of digital inclusion in the light of a restrictive local labor market regime resulting from national policies of exclusion and control of immigrants.

We should add that the reach of commodification goes beyond the labor process itself. In fact, commodification can impact our closest social relations, for example with friends and family. Drawing on ethnographic fieldwork in Jakarta, Johan Lindquist focuses chapter 4 on the work of social media marketing services—that is, those involving the semiproduction and reselling of social media followers, likes, comments, views, and so on. At the heart of the digital production networks described in his chapter is "the combination of automation from below, shifting patron-client relations in the context of urbanization, and [entrepreneurial] aspiration." In describing how entrepreneurs in Jakarta recruit their friends, neighbors, and relatives to perform this type of illicit work in the shadows of (Western) social media platforms, Lindquist shows how work is grounded not only in distinct spatial and urban contexts but also in commodified social relations of production. To paraphrase Marx and Engels ([1848] 2008, 38), "The need of a constantly expanding market for its products chases [platform capitalists] over the entire surface of the globe. [Platforms] must nestle everywhere, settle everywhere, and establish connections everywhere."

Planetary Competition and Resistance

If the worldwide infrastructures, and the systems built on top of them, facilitate legibility of outputs and processes, the labor within those systems becomes a highly tradable commodity in a planetary system. And with a network linking together billions of people, most of whom live in low- and middle-income countries, we have a system of planetary competition. In a variety of ways, this book shows that the fact that capital and labor can operate out of and command different scales is a fundamental driver of exploitation.

In his study of the offshore outsourcing industry, Jamie Peck (2017, 10) notes that the logic of cutting and suppressing costs is the "elemental rationale" of the practice. Businesses can tap into workforces with ever-lower labor costs. At the same time, for almost all types of digital work, there are fewer digital jobs than there are workers able and willing to do them, creating an oversupply of labor that drives an international race to the bottom (Graham and Anwar 2019). Workers are naturally rooted to the places in which they live. "Labour power has to go home every night," as David Harvey (1990, 19) famously notes. However, while workers stay rooted and embedded in their local contexts, the lead firms that buy their labor do not have to be—they can search for the cheapest and most accommodating labor markets and regimes in any location across the whole surface of the globe.

Despite the intense competition arising between workers suddenly thrust into a planetary market, the chapters in this book show that there is no "global homogeneous workforce" that is alienated from the fruits of its labor in one, standard way. There are instead a range of factors, including racialized and gendered inequalities, that shape why particular workers in particular places are attracted to and enrolled into planetary networks. In chapter 18, Payal Arora and Usha Raman examine how the gendered nature of global value chains complicates the struggle for fairer supply chains. They specifically focus on the potential of digital storytelling campaigns to leverage the creative power of worker collectives, arguing that "we need to ask who and what determines how women workers are represented and reproduced on the Internet, how communities are formed and sustained, and whether and what kinds of change are possible." As they remind us, race, gender, cost, language, and culture all shape how people connect in the planetary market.

At first glance, the status quo of planetary competition between workers, coupled with unstable (or variable) labor demand, seems to create a structural precondition that inhibits any effective associational counterpower. But all is not hopeless for workers. The same networks that can produce a race to the bottom in terms of both pay and working conditions can be repurposed for new imaginings of solidarities and collective power. But can such solidarities arise *despite* and *across* racial and national differences? That is the key question of JS Tan and Moira Weigel, discussed in chapter 12. Focusing on the 996.ICU movement (i.e., protesting the "9:00 a.m. to 9:00 p.m., six days a week" working regime) initiated by software programmers in China in 2019, Weigel and Tan unveil the tensions between digitally mediated cognitive labor and transnational capital flows in shaping shared worker identities. They describe how workers repurpose transnational infrastructures of exploitation as infrastructures of collaboration (e.g., between Chinese and American software workers), thereby scrutinizing the supposedly frictionless nature of cognitive work. While workers today often lack effective bottlenecks or pressure points at which the collective withdrawal of their labor might prove effective, the very technology that fragments and commodifies their work simultaneously affords them the ability to coordinate at a scale previously unimaginable. It is from this foundation that we might imagine new ways of building worker power and networked forms of disruption.

However, the tensions between labor and capital do not play out in the same way across settings. Instead, the nature of such struggles is always shaped by contextual and geographical particularities. In chapter 3, Julie Chen and Cheryll Ruth Soriano advance our understanding of low-paid work in globalized platform capitalism. Juxtaposing the experiences of Filipino crowdworkers and Chinese workers in the ride-hailing and food-delivery

sectors, Chen and Soriano pay particular attention to everyday resistance strategies on both individual and collective levels vis-à-vis modes of algorithmic management and control. While platforms and algorithms give rise to changing geographies of work, they also reconfigure the nature of labor contestation (see also Ferrari and Graham 2021).

These broader transformations affect not just the resistance strategies available to platform workers but also the organizational structure of unions. In chapter 17, Christina J. Colclough emphasizes workers' data rights and the key role of trade unions around the world in negotiating what she calls the "data life cycle at work." Unions, she asserts, should negotiate across the *entire* data life cycle at work/in production: from data collection to analysis, storage, and data off-boarding. It is therefore essential that we move beyond the individual rights stipulated in national data protection laws and consider data rights as collective rights—for example, by pushing for new ILO conventions that protect workers. Colclough's proposals include workers and places that are not connected to the planetary market. After all, she writes, "a globally established and enforceable set of rights will make sure that they too will be protected when that time comes."

Structure of the Book

As ever more work is commodified and traded beyond local labor markets, and as ever more workers continue to produce immaterial outputs, it is crucial to understand how these changes are affecting workers themselves and the wider transnational economic networks they are embedded in. We have therefore organized the book into four key sections:

1. Grounding planetary networks
2. Mapping planetary networks
3. Dissecting planetary networks
4. Reimagining planetary networks

The first section focuses on the experience of work in planetary systems, especially the conflicting dynamics of commodification and decommodification. These chapters point to the fact that labor remains geographically sticky and embedded in distinct contexts despite the fact that work is being embedded in planetary networks of production and consumption.

The second section highlights the different layers of digital production, the nodes in planetary networks, and how they relate to one another. While the first section provides case studies of the experience of work in planetary systems, this section addresses

how these networks of work can be mapped and problematized in relation to questions of geopolitics and economic development.

The third section offers ways to dissect planetary networks of digital production. Our rationale for including this section is not simply to point to a few "appropriate" theoretical lenses or prisms but rather to highlight the productive multiplicity and interdisciplinarity of thinking about digital work and its networks in the contemporary historical moment.

The fourth and final section provides four imaginative chapters that not only challenge conventional wisdom but also provide constructive and practical suggestions to regulate digital work in the planetary market.

The Present and Future of the Planetary Market

In *Death of a Discipline*, Gayatri Chakravorty Spivak vividly outlines why she prefers the term *planet* over *globe*: "The globe is on our computers. No one lives there. It allows us to think that we can aim to control it. The planet is in the species of alterity, belonging to another system; and yet we inhabit it, on loan" (Spivak 2003, 72).

In this spirit, to speak of the planetary market is to posit instead a normative vision of an interconnected system that is aimed at fostering dignity, humility, empathy, mutual care, and worldwide solidarity. Wherever on the planet you may be and whenever you read these words, we hope that you find inspiration by studying the various chapters of this volume: Inspiration to appreciate and scrutinize the role of connectivity in today's world and the worlds to come. Inspiration to consider that nothing is inevitable about the globe-spanning systems and networks of computing that shape and are shaped by always-embedded social, cultural, and economic action and transactions. And, crucially, inspiration to reimagine and rebuild connectivities and connections in ways that center values that are both human and humane.

With more than five billion people connected to the Internet, and high-speed connections available everywhere—from Manhattan to Mozambique, from Antarctica to the International Space Station—this book explores how changing connectivities are transforming the networks of work and the experience of workers in these networks. It does so without resorting to restrictive imaginaries that either overemphasize the ways "geography still matters" or alternatively wish away the tethering of work to place. It does so to answer a combination of descriptive, theoretical, and normative questions that aim to both understand and reimagine the relative embedded and disembedded, material and immaterial, synchronous and asynchronous, and territorialized and deterritorialized natures of digital production today. The planetary market that we seek to

understand, in other words, is one in which labor can be easily exchanged asynchronously and nonproximately but also one in which access, control, and power to negotiate the market are far from even. The market exists on a planetary scale, and—even though some of its features and participants can appear to seamlessly interact and transact in unbounded, friction-free, and transspatial ways—its participants are always firmly rooted in their own material geographies. And, as all the chapters of this book show, those geographies play a profound role in shaping the outcomes of the market for all its participants.

Notes

1. As Hess (2018, 2) puts it, a global production network can be defined as "the nexus of interconnected functions and operations through which goods and services are produced, distributed, and consumed."

2. See https://www.internetworldstats.com/stats.htm.

3. Digital labor platforms can be thought of as a set of digital infrastructures that mediate interactions between consumers and workers, bringing together the supply of and demand for labor. In most cases, a single company controls that infrastructure as a proprietary resource. However, there are also examples in which control is exerted by multiple economic actors. In this book, we therefore distinguish between two types of platforms: Geographically tethered platforms require that a job be done in a particular place (e.g., delivering food from a restaurant to an apartment or driving a person from one part of town to another). Cloud platforms, in contrast, manage work that can, in theory, be requested and conducted from anywhere. Requesters, or clients, in one country can use such platforms to find workers who may be located anywhere on Earth.

4. Artificial neural networks (ANNs) are computing systems that mimic the electrical operations of the brain's neuronal connections. Some ANNs apply deep learning techniques in that their hundreds of layers "are not designed by human engineers: they are learned from data" (LeCun, Bengio, and Hinton 2015, 436). Although the full history of ANNs goes back to the last century, the confluence since 2012 of three developments has been instrumental for them: the availability of large human-labeled training datasets, advanced algorithms to make sense of patterns, and immense computing power to perform the necessary modeling tasks.

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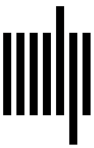

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