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The Handbook of Peer Production

Chapter 3: Political Economy of Peer Production

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Chapter 3 – Political Economy of Peer Production

1. Introduction

Understanding the political economy of peer production requires consideration of at least two interrelated factors: the economic factors that enabled the rise of peer production and the unique cultural factors within peer production communities that have the potential to subvert the prevailing tendencies of global capitalism. The economic factors can be found in the broader structural changes occurring within capitalism throughout the 20th century, particularly after World War II and in the run-up to the Vietnam War era when global geopolitics was being reshaped by a wave of independence movements in the global South as well as increased war expenditures in the United States. All of these factors set the stage for a response to the economic crisis of 1970s. It was during this time that capital responded to the long downturn by searching for new opportunities for boosting profitability (Brenner, 2006). On the one hand, these changes had dramatic effects on labor processes, commodity supply chains, and manufacturing practices, all of which became increasingly networked to maximize efficiencies and reduce excess capacity.

On the other hand, these changes – and especially the rise of computers and networked communication systems – enabled greater interconnection between people who could collaborate with one another to produce collectively governed resources. As such, there were contradictory forces at play in the increasingly networked global economy. Networking capabilities not only began to transform labor processes across the globe, but simultaneously allowed for production that was no longer driven by market demands. Communities of peers connected by networked communication technologies began producing informational or digital commons, which were made freely available to others. Benkler (2006) framed this type of production as *commons-based peer production*, which he defined as "a new modality of

organizing production: radically decentralized, collaborative, and nonproprietary; based on sharing resources and outputs among widely distributed, loosely connected individuals who cooperate with each other without relying on either market signals or managerial commands" (p. 60). For example, the free and open source software movement provides an exemplary case of what commons-based peer production enables, in that it was driven by an ethos of sharing and a strong belief in productive freedom (Coleman, 2013). This community, as well as other communities of commoners around the world, challenged longstanding assumptions in economics about competition, self-interest, and the maximization of individual profit. Indeed, these communities challenged fundamental definitions of *value*, including what it meant and how it circulated within communities.

This chapter considers the political economy of peer production by contextualizing the rise of peer production within capitalism and evaluating to what extent peer production contradicts, or reinforces, these global economic trends. To that end, I begin by tracing the structural changes of capitalism in the 20th century that provide the economic foundation upon which peer production arose. Accompanying these changes was also a shift toward more flexible work routines that privileged creativity, autonomy, and innovation. I argue that the roots of peer production lie in these transformations. Finally, I discuss some more recent scholarship about how value is created and circulates within commons-based peer production communities and discuss how these circuits of commons value intersect with capital accumulation circuits. One of the pressing questions running throughout this discussion is whether this emergent value system has the potential to bring about a post-capitalist future, in which the values of care, trust, mutual aid, and conviviality are prioritized rather than capital accumulation.

2. Transformation of Capitalism in the 20th Century

The historical changes of capitalism that enabled the rise of peer production can specifically be found within the 1970s and the response to the economic crisis. In making such an argument, I draw from critical scholars like David Harvey (1989, 2010) and Robert Brenner (2006) by focusing on the structural changes in the global economy and how those changes affected the broader geopolitics of global capitalism and the labor processes. I also draw from Dan Schiller's (2014) theory of digital capitalism in foregrounding "communication and information as an emerging pivot of the ever-mutating political economy," as it was during this time that global commodity supply chains, financial networks, and military technologies were becoming increasingly networked through information and communication technologies (p. 5). The goal of this broad overview is to identify important historical trajectories, even if this means sacrificing some of the nuance in particular details.

Prior to the 20th Century, the early stages of capitalism were marked by industrial growth and increasing complexity in the division of labor. To address this complexity and streamline production, scientific principles were applied to the production process, which simplified the labor process by breaking down various stages involved in the production process into its component parts. These changes are often associated with Taylorism, as it was Frederick Taylor's *The Principles of Scientific Management* (1911) that outlined the inefficiencies of human work and identified ways of optimizing efficiency in production. Once these distinct stages of the production process were identified, those same scientific principles could be used to construct machinery that would supplement or altogether supplant

increasingly deskilled human labor. The pressures to increase productivity and the development of assembly-line production are also associated with Fordism, as Henry Ford's assembly line in 1913 made possible the mass production of automobiles.

Long before Ford's assembly-line production, Karl Marx was analyzing the mechanisms of capitalist production, particularly toward the latter years of the Industrial Revolution from roughly the 1840s to the 1880s. His task was a critique of existing political economic thought, while specifically focusing on the consequences of capitalist production for the growing numbers of laborers who were joining the working class. Focusing on industrial factories in the mid-1800s, Marx determined that labor was being exploited in at least two primary ways. First, surplus value was being extracted from labor through the prolongation of the working day, which Marx referred to as *absolute surplus value*. Second, and perhaps most important for the present discussion, was the extraction of what Marx referred to as *relative surplus value*, which drew attention to the ways the "technical processes of labor and the composition of society" were being revolutionized (Marx, 1906, p. 559). In other words, ongoing changes in the technical processes involved in production constantly placed pressure on workers, especially as they were subject to deskilling (i.e., reduction in the skills necessary for performing certain tasks), reskilling (i.e., learning how to operate new technologies), or automating jobs that were previously performed by humans.

These trends would continue into the 20th Century, as global capitalism began to take shape. What emerged was a complex division of labor and an increasingly globalized capitalist economy. These developments also gave rise to a large pool of working class labor with common interests. As a result, workers in the global North organized into trade unions to struggle against capital for fair wages, the eight-hour work day, the end of child labor, and

other labor rights. As the trade union movement grew, it ensured a certain degree of welfare for workers and created a shared identity among the working class.

As the 20th century wore on, World War II, and particularly its aftermath, significantly reshaped the geopolitical landscape.[1] The United States' competitors in the global market were devastated by World War II, as their infrastructures were decimated by bombing campaigns, which caused manufacturing to decrease significantly. By comparison, the centers of American manufacturing remained basically untouched, which gave the United States an advantage in the immediate aftermath of the war. As a result, American firms greatly increased their exports, particularly to Western Europe through the Marshall Plan, which was a boon to the American economy. The United States was keenly interested in exporting its products as well as capitalist ideology around the globe during this time, as it was embroiled in the Cold War with the Soviet Union, and the two countries sought to expand their influence around the globe. The United States represented the "first world," which was capitalist and developed, the Soviet Union represented the "second world," which was socialist, and those countries that were not aligned with either capitalism or socialism were referred to as the "third world." While the struggle between the United States and Soviet Union generally frames the dominant narratives of this period, there were also strong political movements within the non-aligned nations (see Prashad, 2007). However, the United States also faced increasing pressure from other "first world" countries during this time frame. In the 1950s and 1960s, Japanese and German manufacturing grew rapidly and, as the global market grew, these competitors began to cut into American market share. The increased production and supply placed downward pressure on prices and, by the 1960s, Japan and Germany were able

[1] This paragraph provides a basic summary of the argument made by Robert Brenner. For more information, see Brenner, R. (2006). *The economics of global turbulence*. London: Verso.

to undercut American prices, which had higher fixed costs. Exacerbating the pressure felt by the United States was the increased war spending during the Vietnam Era. All of these structural pressures set the stage for the global economic crisis of the 1970s.

3. Response to the Crisis of the 1970s

The crisis of the 1970s placed significant pressure on the profits of U.S. capital. In response, policymakers and shareholders sought measures of restoring profitable capital accumulation. These measures essentially unfolded along two axes. First, policymakers began to cut away at policies designed to protect worker rights. These efforts began in the late 1970s, but really ramped up after leaders like Ronald Reagan, Margaret Thatcher, and Deng Xiaoping took office. These leaders ushered in an era of deregulation and the privatization of national industries, which also cut away at protections for labor (see Harvey, 2005). The upshot of these regulatory changes was a reduction in wages and the outsourcing of jobs, thereby reducing the fixed costs of firms. Second, shareholders and business owners also sought ways of reducing the fixed costs associated with their business operations. This was made possible by new developments in information and communication technologies, most notably software, which allowed owners to track their production processes in a more sophisticated way. The result was a further disciplining of labor and the maximization of efficiency throughout commodity supply chains. Furthermore, commodity supply chains could now be networked across geographic boundaries to take advantage of cost savings wherever they existed. This allowed for what Harvey (1989) refers to as *flexible accumulation*, which is "characterized by the emergence of entirely new sectors of production, new ways of providing financial services, new markets, and, above all, greatly

intensified rates of commercial, technological, and organizational innovation" (p. 147). In effect, this new model of production no longer relied on mass production, which was the hallmark of Fordism. Rather, it made possible on-demand production, which reduced stockpiles of mass-produced inventory while simultaneously allowing firms to adapt to ever-changing demands from consumers.

One of the critical elements enabling this type of business model was the development of networked communication technologies, which could be put into the service of capital. It was during this time that information and communication technologies became viewed as a new vehicle for reinvigorating capital accumulation, and the sector saw massive capital investment, especially in the 1990s, while United States manufacturing remained stagnant. Indeed, the massive surge in venture capital investment into the so-called "dot-com" companies during the 1990s fueled the financial bubble that eventually burst in the early 2000s (Cassidy, 2002). The investment in digital technologies continues today, as similar investments can be seen in a number of digital services that promise to reinvigorate capital accumulation, whether they are digital platforms like Uber, Lyft, Spotify, or cryptocurrency technologies like Blockchain.

Accompanying these economic changes was also an ideological shift, particularly in the ways in which participation in capitalism was justified. Boltanski and Chiapello (2005) refer to the "spirit of capitalism" as the "ideology that justifies engagement in capitalism" (p. 8). They argue that the spirit of capitalism shifted from the 1970s onwards. During this time, business culture – in the form of management texts – began to abandon the rigidities of hierarchical Fordist production in favor of flexible and network-based forms of organization. In doing so, capitalism effectively assimilated the artistic critique of capitalism of the 1960s

and 1970s by touting individual autonomy and emphasizing employee initiative as a path to self-fulfillment, whilst marginalizing its social critique, embodied in trade unions and more concerned with wage inequality. In short, employment was not simply something necessary for earning a living, but it was also a way to achieve creative freedom through self-expression. The espousal of these new forms of freedom and autonomy for workers proved to be an effective way of reducing the fixed costs of corporations. As more workers embraced flexible work routines, they carried the burden of funding their own benefits like insurance, retirement plans, etc. Indeed, this trend can also be viewed today in a number of industries where freelance work has become prevalent, but the trend is particularly pronounced in the media and journalism industries as well as so-called "creative" industries that employ artists, fashion designers and stylists (see Deuze, 2007; McRobbie, 2016; Cohen, 2017).

4. The Transformation of the Internet and Web-Based Business Models

The structural changes of capitalism throughout the 20th century laid the foundation for the emergence of the Internet as a vehicle for intensifying capital accumulation. Furthermore, this process really began to ramp up toward the end of the 20th century when Internet service provision was privatized. In the wake of its privatization, Internet- and web-based businesses went through a relatively rapid boom-and-bust cycle. While these years were somewhat tumultuous for speculative financial capital, the general tendency to network the world continues, as more and more people, places, and things become interconnected through digital technologies. In what follows, I focus on how the Internet transformed from a publicly funded research and development project to an unprecedented instrument for capital accumulation.

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We can begin by looking at the development of the Internet and its various iterations before it was privatized in the 1990s. Early research and development into a distributed network architecture was funded by the Defense Advanced Research Projects Agency (DARPA) in the United States. Established primarily to meet the needs of military demands, the development of DARPANET provided the initial architecture for what would eventually become the Internet in the United States. However, the network passed through various changes, including both ARPANET, MILNET (for military sites), and NSFNET, named after the National Science Foundation, which administered the network until 1995 (see Abbate, 1999). These iterations of the early Internet were funded directly by public money through the Department of Defense and were designed to serve two essential functions. On the one hand, military sites could be linked through MILNET, while ARPANET linked various civilian research communities so they could share information freely with one another. The latter function was achieved through NSFNET's Acceptable Use Policy (AUP), which ensured that the network was used for non-profit research and educational purposes while also prohibiting most commercial use. The policy remained in effect until the early 1990s, at which point commercial Internet service providers were allowed onto the network. In other words, one of the foundational principles of the early Internet was that information on the network ought to be freely available to others. This same principle is also identified as one of the tenets of the "hacker ethic" as defined by Levy (2010). The privatization of the Internet culminated in 1994 after a contentious hearing before the U.S. Congress where the decision was made to relinquish public control of the network to commercial providers.

The privatization of Internet service provision dramatically increased Internet connectivity throughout the 1990s as more and more people migrated online. In response,

businesses sought to take advantage of the growing market for Internet services and web-based business models. Companies like America Online thrived in the market for Internet service provision, while the online marketplace eBay was founded in 1995. The introduction that year of the https protocol enabled secure financial dealings so that sellers like Amazon and services like eBay became the dominant business model of the "Web 1.0" era, which was aimed at providing content to consumers on web pages or selling web-based products or services directly to consumers. Meanwhile, Microsoft dominated the market for Internet browsers by negotiating a partnership with IBM, whereby IBM's personal computers would come pre-packaged with Microsoft's Internet Explorer installed on IBM's hardware. Microsoft exemplified the power of companies during this era by developing and selling software either directly to consumers or to original equipment manufacturers (OEMs) like IBM. Since IBM dominated the market for personal computers, as well as computers sold to other enterprises, Microsoft effectively prohibited any competitor from mounting a challenge to its monopolistic position, especially in the market for Internet browsers. Indeed, it was Microsoft's agreement with IBM that eventually led to its conviction for antitrust violations in 2001 after the United States Department of Justice found the company guilty of anticompetitive market behaviors (see *The United States v. Microsoft*, 2001). The Microsoft antitrust conviction coincided with the bursting of the dot-com bubble, which began roughly in early 2000 and lasted through the end of 2002. On the day that the Microsoft antitrust decision was announced, the NASDAQ stock exchange lost approximately 8% of its total value and Microsoft alone lost nearly $80 billion of its market value (Ulick, 2000). From its peak in March, 2000 to its trough in October, 2002, the NASDAQ lost nearly $5 trillion in value (Gaither & Chmielewski, 2006).

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Emerging out of the dot-com crash came a reinvention in the way web-based business would be conducted. Companies began to abandon old business models aimed at selling products and services directly to consumers. Instead, the consumers – or data and information about consumers – became the primary products of the emergent "Web 2.0" economy, a term coined by Tim O'Reilly (2005), which, among other things, was characterized by providing interactive services to users so user-generated content could be monetized by the platforms upon which those users interacted. It was within this context that we saw the rise of Facebook, Google, Wikipedia, and even the transformation of Amazon from simply a book-selling company in the 1990s to one that began offering Amazon Web Services in 2002. This transformation in business models had dramatic consequences for social life, which is increasingly mediated by digital technologies. Ursula Huws (2014) summarizes this succinctly:

> "When human sociality is mediated by telecommunications systems, it leaves digital traces wherever it goes, traces that can be mined to generate data that enable advertising to be targeted with ever-greater accuracy. The Internet is thus constituted as a vast virtual shopping mall, with its users bombarded with a constant stream of advertising, preying on their most personal vulnerabilities" (p. 15).

These concerns have been explored within scholarly debates about immaterial labor, free labor, and digital labor (Lazzarato, 1996; Terranova, 2004; Scholz, 2013). The primary concern in these debates has been the nature of work and labor within the information,

knowledge, and communication industries with a focus on forms of unpaid labor occurring online (see Andrejevic, 2007, 2012; Fuchs 2012). Particular attention has been paid to users' online behaviors, which are tracked and can be transformed into an audience commodity in the same way that Dallas Smythe (1981) identified with broadcasting. However, whereas Smythe argued that broadcast programs constituted a “free lunch” by producing audiences for advertisers, the parallel to online activity lies in platforms or web sites seeking the attention (or interaction) of users while data is collected about those activities. As we continue to rely on digital devices for an increasing amount of our social lives, the time spent online during both work and non-work time, our digital labor – socially necessary time spent online – offers a more sophisticated form of the audience commodity as browsing data is extracted and transformed into value by service providers and other third-party elements (Fuchs, 2011; McGuigan & Manzerolle, 2013; Turow, 2013).

The tendency of Internet platforms to monitor, measure, collect, and ultimately monetize data about their users has become one of the dominant business models existing online today. The idea is seemingly sound: encourage users to socialize, interact, create, share, or otherwise rely upon your service for connecting with others, and platform can extract data from those interactions the that can be monetized through sales to advertisers or other data companies. In effect, users are generating value *gratis* for these platforms, and there is evidence to suggest that the vast majority of users do not realize this. One recent study showed that 74% of Facebook users did not know the site maintained a list of their interests and traits, and 51% of respondents claimed they were not comfortable with this (Hitlin & Rainie, 2019). However, platforms generally continue to grow rapidly as more people migrate online and begin to use their services. This general trend remains true even if some platforms

struggle to become profitable. For example, the music-streaming platform Spotify was unprofitable for its first ten years, and only reported its first profitable quarter at the end of 2018 (see Wang, 2019). Ride-sharing companies, Uber and Lyft, similarly struggle with profitability (see Colley, 2019). Because of the potential for rapid growth and the prospects of future profitability, tech startups continue to draw attention from venture or investment capital. The massive capital investment in these companies, which seem to be valued more for their growth than their profitability has led some to predict that it is only a matter of time before we experience another tech bubble burst (Colley, 2019).

Despite the seemingly bleak picture presented here, however, there are also contradictory forces within these developments that suggest we may also be witnessing the emergence of a new subjectivity, which is capable of counteracting the incessant drive for capital accumulation. Indeed, it is within these contradictory forces that we can begin to understand the different dynamics at play in the political economy of peer production. At times, these forces exemplify the drive to accelerate capital accumulation, as I have already outlined above, while at other times these forces work to ensure the survival of collectively governed resources.

5. The Commons as Alternatives

The previous sections of this chapter outlined the historical forces that led to the transformation of global capitalism in the 20th century and explained how and why platforms for extracting value from activities taking place online were developed. However, despite the fact that the forces of capitalism (digital, surveillance, or otherwise) seek ways of exploiting the shared experiences of people around the globe, the fact that people are becoming more

interconnected also means that they can collaborate in ways that subvert some of the dominant tendencies of global capitalism. Some scholars also see radical potential within these shared experiences and the values inherent in commons-based peer production that may have the potential to bring about an alternative future. In other words, the early parts of this chapter focused on the *external* factors that made possible peer production, but we now need to consider the features *internal* to peer production that make it unique as well as capable of challenging those external forces. In the remaining portions of this chapter, I draw on a growing corpus of scholarship that positions peer production and the commons or "the common" as an alternative to capitalism.

In their examination of empire, Hardt and Negri (2000, 2004, 2009) argue that the sovereignty of the nation state has been replaced by a decentralized and ever-expanding regime of power that demolishes barriers between what is inside and what is outside of the empire. What emerges from this system of power is an interconnected network, which is capable of managing "hybrid identities, flexible hierarchies, and plural exchanges through modulating networks of command" (Hardt & Negri, 2000, p. xii-xiii). But whereas these networks enable the nearly seamless flow of global capital, command of commodity supply chains, and increased control and discipline of labor, they also simultaneously give rise to contradictory forces that challenge the prevailing order. For example, the increasing interconnection of peoples, places, cultures, creativity, etc. makes possible the creation of "the common." By "the common," Hardt and Negri refer not only to "the common wealth of the material world – the air, the water, the fruits of the soil, and all nature's bounty" but also to "those results of social production that are necessary for social interaction and further production, such as knowledges, languages, codes, information, affects, and so on" (Hardt &

Negri, 2009, p. vii). The production of the common, particularly as it pertains to peer production online, manifests in the sharing of free and open source software projects, open access book projects, "wikis" dedicated to curating knowledge and information, cultural products in the public domain, and many other projects aimed at creating and preserving shared resources that may be accessed by others.

However, there is more at play in the commons than simply a collectively governed resource. The commons can also be viewed as a "process of becoming," which moves beyond the commons as an identity and orients human activity toward an ethical horizon to which we can aspire (Dyer-Witheford, 2006; Hardt & Negri, 2009; Ryan, 2013; Gutierrez-Aguilar, 2014; Singh, 2017). For this reason, Linebaugh (2008) prefers the active verb "commoning," which he explains is "embedded in a labor process"; it is collective, and it is "independent of the temporality of the law and the state" (p. 45). Moreover, this framing helps account for the "dual nature" of the commons, which encompasses both the objects of the commons (i.e., a collectively governed resource to which all members of the community claim some association) as well as a subjectivity in which the values of mutual aid, care, trust, and conviviality can be produced and reproduced over time (DeAngelis, 2017). The focus on reproduction is particularly important here, as it corresponds to the critiques from feminist political economy that drew attention to forms of unwaged labor and social reproduction, both of which are instrumental to capitalism but also sites of struggle (Dalla Costa & James, 1975; Jarrett, 2016; Federici, 2012).

Furthermore, positioning the commons as a process of becoming adds critical weight to commoning practices by demonstrating how those activities are capable of bringing about a postcapitalist future. The term 'postcapitalism' is generally used to describe a number of

different proposals for developing a new economic system to replace capitalism. While there is no unified theory of what postcapitalism is or what it will look like, most thinkers writing about the subject generally agree that the contradictions within capitalism and the recurrent crises of capitalism are unsustainable in the long run. Therefore, they offer proposals for what a postcapitalist future will look like as well as different proposals for how such a system can be achieved. In a sense, these thinkers are revitalizing the tradition of utopian socialism, which offered visions of a future society that was comprised of freely associating individuals living in harmony with one another. Early utopian socialist thinkers, like Henri de Saint-Simon and Charles Fourier influenced Karl Marx, and Marx's work is often situated within a combination of three conceptual areas: political economy, German classical critical philosophy, and utopian socialism (Harvey, 2010). While Marx remains somewhat vague in his specific description of society after the abolition of capitalism, he carried on the tradition of utopian socialism in thinking that another world was possible. In Marx's formulation, such a transition was only possible through the revolutionary struggle of the working class against capital.

More recent accounts of postcapitalism focus on the ways that social relations are beginning to transform in ways that are antithetical to capitalism. For example, one of the earliest uses of the term 'postcapitalism' comes from Peter Drucker's (1994) book, *Post-Capitalist Society*. Noting that the transformation toward more information- or knowledge-based economies in the global North, and particularly the United States, Drucker argued that such a shift fundamentally changes the social, economic, and political dynamics throughout society. As a management consultant and educator, Drucker's analysis of postcapitalism was not about radically transforming or replacing the capitalist system but recognizing the shifts

occurring from within capitalism and how business organizations could adapt their strategies to survive in this new form of capitalism.

Two other recent works have become influential for thinking about postcapitalism. One account comes from the journalist Paul Mason (2015), whose account of postcapitalism does not shy away from a critique of capitalism. Mason argues that the imbalances of power and the increasingly devastating crises at the heart of neoliberal capitalism are ultimately unsustainable. He argues that we need to move beyond capitalism so that it is replaced with an economic system that will be more beneficial and sustainable. To that end, Mason offers five principles for the transition to postcapitalism. The first principle is more of a condition for implementing any project for social change. We need to test all proposals at a small scale then model them many times over before implementing them on a broader scale. Second, ecological sustainability is a necessity for any project in designing the future. Third, the transition to postcapitalism is not simply about economics; it is about human beings, and we cannot privilege economic progress at the expense of social welfare. Fourth, problems must be attacked from all angles, which takes advantage of networked hierarchies. In short, the benefit of networks is that meaningful action can occur at many different levels and it does not need to be centralized. Finally, we should maximize the power of information by learning from the data being generated about social life. However, the apparatus for data collection would be collaborative and de-centralized rather than under corporate control.

Another influential work about postcapitalism comes from Nick Srnicek and Alex Williams (2016) who provide a series of demands that are necessary for the transition to postcapitalism. First, the authors argue for a fully automated economy, which would free up human beings from the required routines of waged labor. More specifically, they argue for a

progressive reduction in work so that necessary labor is reduced as much as possible. Not only would this eliminate some of the social hierarchies between different types of employment, but it would also free up more time for addressing social and community needs. Second, the authors argue for a reduction in the length of the work week with no reduction in pay. Third, the authors argue for a universal basic income that is sufficient for living, given without qualification, and acts as a supplement to the welfare state rather than a replacement. Finally, the authors argue for a diminishment of work ethic, or the development of a counter-hegemonic approach to work. Such an approach "would overturn existing ideas about the necessity and desirability of work, and the imposition of suffering as a basis for remuneration" (Srnicek & Williams, 2016, p. 125).

At the heart of these proposals is the recognition that commons-based movements and the active process of commoning carry something within them that points to another way of living. In a sense, the proposals offered by Mason (2015) and Srnicek and Williams (2016) take for granted the achievements of commons movements without probing into the specific dynamics of how value is created and circulates within communities of commoners. Massimo DeAngelis (2017), however, has offered such an analysis, particularly of the way that value circulates within the commons and commons-based communities. Figure 1 below illustrates one attempt to chart how value circulates in the commons through the circuit of commons value. In this figure, an association of people (A) claim collective ownership of their commonwealth (CW), whether the sources of commonwealth are material, immaterial, commodity (C), or non-commodity (NC). This dual relationship between the association of commoners, as subjects, and their commonwealth, as objects, constitutes the commons (Cs).

Through the activity of commoning (cm), the commons are produced and reproduced over time, which ensures their survival.

Figure 1: The Circuit of the Commons

[INSERT FIGURE 1 HERE]

Source: DeAngelis (2017), p. 193

While this circuit of value differs from capital accumulation circuits, this is not to say that commoners do not interact with capital or the state. Rather, for DeAngelis (2017), circuits of commons value can couple with capital circuits through the commodity form, which is also pictured in the figure. Rather than arguing that these two circuits can or ought to peacefully coexist, DeAngelis simply demonstrates that they do co-exist. For example, when commoners must interact with the money form of capital, they do so only as a medium of exchange to gain access to the materials necessary to reproduce the commons and themselves over time. As this relates to the digital commons, free software contributors or users will need access to a computer in order to code the digital commons or access them. In addition, programmers will need to have access to food, water, shelter, and all those things necessary to reproduce their own capacity to code the digital commons over time. These goods may be provided by the welfare state or one's family but, in the absence of such provision, one would need to intersect with capital circuits to obtain them. However, the extent to which commoners engage with capital circuits is left up to the community and will vary depending on the unique situation of each community.

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The goal for any commons-based movement, however, is how to ensure that the value created within the community is preserved rather than extracted by capital or the state. Bauwens and Niaros (2017) explore this dilemma through an analysis of value within the commons economy. The authors argue that economic theory is experiencing a "value crisis" in light of the emergent practices of commons-based communities. They argue that whereas value within capitalism is *extractive,* a shift to a *generative* value model would enrich the communities and resources directly involved in production. In response to these concerns, open cooperatives and platform cooperatives (Scholz, 2014) have been developed as organizational forms that seek to directly enrich those involved in production. However, the specific tactics used by open cooperatives to ensure that the value created by their contributors stays within the commons may vary. In other words, rather than imposing a "one-size-fits-all" approach to organizing, the commons framework remains flexible, allowing local communities to make choices about how to govern collective resources. The recognition here is that local communities will have a much more sophisticated understanding of their collective resources, including the institutional, political, cultural, and social contexts within which the resource is situated.

Within commons-based peer production, we also have numerous examples of the ways in which communities negotiate their relationship with capitalist firms. One notable example of how this is done is through the creation of "boundary organizations," which are established to negotiate and establish boundaries between two parties who may have both disparate and shared interests (O'Mahony & Bechky, 2008). Within free and open source software development, communities working on free software projects want to ensure the survival of their software projects and attract other developers to work on the project, and

securing corporate sponsorship of a project can be a direct way of attracting more developers to the project (Santos, Kuk, Kon & Pearson, 2013). However, the community also has an interest in preserving its creative autonomy by not ceding too much influence or power to the corporation. One example of a boundary organization is the Fedora Project Board, which negotiates the boundaries between the Fedora Project as a free software project and Red Hat, Inc. as its corporate sponsor (see Birkinbine, 2017).

These examples illustrate the tension that lies at the heart of peer production and the commons. On the one hand, communities want to ensure creative autonomy for their members as well as the survival of their common resources over time. On the other hand, commons-based peer production provides an intriguing opportunity for capitalist firms looking to extract value from the community's productive activities. Indeed, commons-based peer production has proven to be an efficient and effective model of production, even producing large-scale projects like the Linux kernel, which contains millions of lines of software code (see The Linux Foundation, 2019). When firms want to harness the production power of commons-based communities, they often need to find ways of negotiating access to those communities, particularly because their interests may differ from those of the community.

6. Concluding Remarks

This chapter has provided an overview of the political economy of peer production. I began with an examination of the structural changes within capitalism that enabled the rise of peer production, and I also focused on some of the emergent cultural practices of peer production that subvert prevailing tendencies of capitalism. As such, there is a tension between capital and the commons that is constantly at play in the political economy of peer

production. In this sense, it is useful to understand peer production as dialectically situated between capital and the commons, as it can account for the contradictory power of peer production, highlighting the ways that peer production intersects with circuits of capital accumulation but also the ways in which value is created and circulates within peer production communities according to a different logic. On the one hand, the extraction of value from data and information provided *gratis* to corporations has been a boon to capital accumulation schemes – certainly as it pertains to rapid growth and the attraction of speculative financial capital, if not proven formulas for profitability. On the other hand, peer production enables the creation of digital commons that can be shared with an increasingly large online community. The production, maintenance, and reproduction of the commons over time also carries the possibility of ushering in an era where mutual aid, care, trust, conviviality, and the commonwealth are valued more than competition, exploitation, and the maximization of individual or corporate profit.

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