Toward a Critical Political Economy of the Digital Commons

Existing theories of the commons come from differing epistemological stances, and they also make very different teleological propositions. Some of the more robust theorising of the commons stems from an institutional approach, which is most often associated with the work of Elinor Ostrom (1990) whose work was discussed in the previous chapter. Such an approach is valuable because it illuminates the ways in which communities cooperate to ensure the sustainability of a commons-based resource. This approach is largely descriptive and analytical in the way that it understands the commons. However, there is also a growing corpus of literature that positions the commons as an emergent value system that has the potential to either transform or replace capitalism. This approach tends to be more interpretive and prescriptive in understanding the commons and their promise for bringing about a post-capitalist future.

The purpose of this chapter is to develop a critical political economy of the digital commons that incorporates a critique of capitalism. I do so by framing the approach to this study within the critical political economy of communications tradition. Critical political economy allows for a dialectical understanding of the contradictions and tensions between capitalism and the commons. To outline these tensions, I begin with a discussion of the political economy of communications tradition. Next, I revisit the work of Karl Marx in an effort to outline the primary concerns of a critical political economy of the digital commons. Specifically, I focus on the nature of commodity production and the ways in which labour is exploited under capitalism. Then, I position FLOSS within existing debates about digital labour, while also drawing from Marxist–feminist theories of social reproduction. Following this discussion, I explore the ways the commons have been understood as an alternative to capitalism, including the ways in which the commons present an alternative circuit of value from those of capital circuits of value. As part of this discussion, I focus

on some of the growing critical scholarship that attempts to pair a critique of capitalism with and within theories of the commons.

Taken together, these approaches to understanding the commons are useful both analytically but, perhaps more importantly, also for the ways in which they offer proposals for a post-capitalist future. The analytical benefit, specifically as it pertains to understanding FLOSS products and processes, is that the commons paradigm can help explain how commons-based peer production and non-market production are enmeshed in processes of capitalist production. By understanding these processes more concretely, we can learn how FLOSS communities negotiate their relationship with capitalist firms and, when necessary, defend their commons-based resources from unwanted influence.

2.1. Political Economy of Communications

At the heart of the political economy of communications tradition is a concern for the 'social relations, particularly the power relations, that mutually constitute the production, distribution, and consumption of media resources' (Mosco, 2009: 24). By investigating the contours of these power relations, political economy can illuminate the ways in which power manifests itself not just as a resource to achieve goals, but also as a form of control that is embedded within a broader set of social relations. In other words, the approach allows for an understanding of power as both a preventative force (i.e. power over something else) but also as a potential force (i.e. the power to achieve change). Power relations are present throughout the social system; they structure relationships and tend to reproduce those structures over time.

To that end, those working within the political economy or, more specifically, a critical political economy of communications (CPEC), are interested in 'uncover[ing] connections between ownership, corporate structure, finance capital, and market structures to show how economics affects technologies, politics, cultures, and information' (Meehan, Mosco, and Wasko, 1993: 347). However, the concerns of those working within the CPEC tradition are not only scholarly; rather, they are often concerned with praxis or theoretically informed practice, whereby scholarly activity is pursued with the goal of achieving more just and democratic forms of communication (Mosco, 2009). Most often, this is done by exposing the ways in which power is manifested within communications industries, whereby the control of informational production, distribution, and access or exhibition is concentrated within only a handful of corporations. These large, often multinational and trans-industrial conglomerates hold oligopolistic power within media markets, which limits the possibility for alternative or counter-hegemonic forms of communication to take place (see Bagdikian, 2004; Meehan, 2005; Birkinbine, Gómez, and Wasko, 2017). By limiting the extent of available alternatives, especially by pursuing proven formulas for cultural production that generate profit for shareholders,

corporations reinforce systems of ideology that, in turn, tend to reinforce institutions of cultural hegemony (Gramsci, 1971). The CPEC approach is therefore rooted in a tradition of critical inquiry, which has roots in the work of Karl Marx and his critique of classical political economy.

2.1.1. Marx, Machines, Labour, and Capitalism

By understanding FLOSS production from a critical political economic perspective, which takes inspiration from the work of Marx, we can account for the ways in which power relations structure the production, distribution, and access of informational resources. As was discussed in the Introduction to this book, FLOSS can be classified as digital commons with unique technological features – mainly, the availability of the source code and the ability to study, modify, adapt, or change the program for one's needs. However, the core value of FLOSS lies in the collective labour power of the FLOSS community. In other words, the *products* of FLOSS (i.e. the Linux kernel, Red Hat Enterprise Linux, the Fedora Project, LibreOffice, etc.) are not the source of FLOSS value, but the *processes* of FLOSS production (i.e. decentralised and distributed commons-based peer production). Because FLOSS production allows for highly efficient, collaborative, and speedy development, the end products of FLOSS production tend to be more secure, adaptable, and progressive because they are under constant revision and improvement by members of the FLOSS community. From the standpoint of corporations like Microsoft, or Oracle, which rely on the sale of proprietary software or services, FLOSS production offers an attractive option for investment because it decreases in-house labour costs and, in effect, outsources the development of core components of software that can then be integrated into their proprietary software or services. To understand the dynamics at play in cooperative production as well as the processes of commodification occurring within FLOSS production, we can revisit the work of Karl Marx.

Marx (1906) was not the first to investigate the inner workings of capitalism and the source of value within capitalism. However, he represented a shift in the study of political economy due to his criticism of previously existing political economic thought. His three volumes of *Capital* offer some of his most thoroughly developed arguments about political economy, and some of his key arguments can provide a framework for understanding the role of technology and technological change within a broader set of social relations. Although his analysis was focused on the industrial production of the mid-1800s, this background will prove useful for considering the general tendencies of capitalist production as well as the ways in which they have changed under digital capitalism.

Marx (1906) begins his analysis of capitalism with a discussion of the commodity. He explains how life appears to be an endless procession of commodities.

The commodity form, however, contains two different values: use value and exchange value. Although a commodity may contain two values simultaneously, the commodity form is still a product of human labour. That is, the process of human labour creates products in the form of commodities. Although different types of commodities require different types of labour, what is common to all commodities is human labour. The value of commodities, then, is determined by the socially necessary labour time required to produce them. These principles provide the foundation for the labour theory of value.

In early economic configurations, the trading of goods for other goods could be expressed in the simple formula: C – C (commodity for commodity trading), which characterises economies based on barter and trade. For such a trade to take place, however, the producers of such goods need to agree on an equivalence in trade (e.g.. ten apples equate to one chair). This form of trading relies on the availability of equivalent goods for such a market to operate effectively. In such a system, an apple farmer who wanted to trade apples for a chair needs certain conditions to be met to obtain the chair. First, a chair needs to be produced. Second, the chair needs to be available for trade. Third, the person who produced the chair would have a need for apples. If these criteria are met, then an exchange can occur. To reduce the uncertainty of supply and demand in such a situation, the money form (M) was introduced as a universal equivalent to which the value of all other commodities can be equated. So instead of trading ten apples for a chair, the apple farmer can sell the apples for $5. The money can then be used to buy a chair when one becomes available. The introduction of the money form, then, introduces a new type of market exchange, expressed as C – M –C (commodity for money for another commodity).

Capitalism, however, relies on larger scale production and a reinvestment in the productive process. In such a system, we can invert the C – M – C circuit to be expressed as M – C – M' , whereby money is invested in the production of a commodity with the intention of re-selling it for profit (M' or, simply, more money). This is possible in a system in which an entire class of people do not have a commodity to sell other than their labour power. In such a system, a division exists between those who own the means of production and those who do not. In other words, the owners of the means of production employ others who do not own the means of production. The engine of capitalism and the beginnings of the exploitation of labour come when the owners of the means of production only pay labourers enough to satisfy their demand, for the goal is to increase profits. By doing so, those who own the means of production continuously reinvest their money into the means of production (buying more land, developing technology, etc.). Consequently, those who own the means of production extract a certain amount of surplus value from the productive process. Thus, society is divided into classes based on ownership of the means of production (capital vs. labour).

In perhaps the most important section of *Capital*, Marx discusses surplus value in depth, including the ways in which capital continues to realise surplus value,

while labour is subjected to various forms of exploitation. Particularly relevant for the current study, however, are Marx's discussions of co-operative labour and the use of machinery. Machinery is just one way in which capital constantly reinvents itself to further exploit labour. The focus on machinery is therefore simply to frame the discussion of new digital technologies and the ways that they have been used by capital and labour alike. Although technological change constantly ensures that labour is always at the mercy of capital because labour does not own the means of production, the argument presented here is that it is entirely possible for technologies to be used as tools of resistance against unwanted encroachments by capital. When put into the service of capital, technology can increase the efficiency of production and thereby increase corporate profits while further alienating labour from the production process. However, technology may be used by labour as a broader part of social resistance and social struggle.

Capital constantly seeks ways to increase surplus value, which requires more productivity by labour. This can be accomplished in at least two ways: absolute surplus labour and relative surplus labour. Absolute surplus labour is used to describe a condition in which labour is asked to work beyond the normally required working time to increase productivity. For example, workers could be asked to work through the weekend as one way of increasing productivity. On the other hand, relative surplus labour is realised when machinery supplements or supplants the time normally spent working by labour. In this sense, workers can still work the same amount of time, thereby keeping the wages owed to them constant, while human labour costs can be supplemented or supplanted by investment in a technology that performs the same function as human labour. With only limited exceptions, such a machine can be worked without the fear of fatigue or the need for sleep. Therefore, production increases without the need to pay additional wages to workers. This, then, is the key for understanding machinery (i.e. technological change) within the operation of capitalism: technology, when put in the service of capital, increases productivity, exploits labour, and is used for the realisation of greater surplus value.

Continuing this line of argument, Braverman (1974) specifically provided an extended discussion of machinery. Braverman's task was to begin a critical history of technology, which would account for the specific ways that technology has been put in the service of capital to further exploit labour. Braverman demonstrated how technological change has constantly forced labour to learn new skills to operate machinery. Furthermore, machinery has been used to supplement and supplant human labour, which drove members of the working class out of work and into unemployment. Anyone wishing to become employed again was forced to learn how to operate new machinery, which furthered the cycle of exploitation. Thus, a vicious cycle of technology development, unemployment, and re-education was implemented to constantly reinvigorate the productive process while demanding that labour constantly acquire new skills.

The relationship between capital and the labour process can also be further understood with regard to the ways that labour processes are brought under

capital's control. Capitalist production is made possible by the unity of the labour process with the valorisation process (i.e. the creation and extraction of surplus value in the production of commodities). Marx uses the concepts of the formal subsumption of labour and the real subsumption of labour. The formal subsumption of labour under capital occurs when the labour process becomes subsumed under capital, whereby 'the capitalist enters the process as its conductor, its director' (Marx, 1864). In other words, the formal subsumption of labour occurs when the *social relationship* between capital and labour transforms; previously independent producers may become dependent on the capitalist through waged labour, for example. Therefore, the introduction of waged labour through becomes the social relationship between capital and labour. The real subsumption of labour occurs at a larger and more general scale when the wage labour relationship pervades social relations, thereby causing transformations within the labour process that can extract more relative surplus value. As Marx (1864) notes, 'just as the production of absolute surplus value can be regarded as the material expression of the formal subsumption of labour under capital, so the production of relative surplus value can be regarded as that of the real subsumption of labour under capital'. These concepts (i.e. absolute surplus value, relative surplus value, formal subsumption, and real subsumption) will be useful in describing the ways that FLOSS labour is exploited by capital, especially given the scale at which FLOSS projects can be developed by large numbers of geographically dispersed programmers.

Marx's analysis offers a useful framework for understanding the relationship between capital, labour, value, and machinery. These four factors are all intertwined in the relationships that exist between FLOSS programmers, their collective labour power, the software they create, and the corporations that make use of their software. The labour theory of value can be used to understand why the processes of collaborative production within FLOSS are so valuable for corporations. Collaborative production in FLOSS expands the possible labour force available to work on a software project to an exponentially greater degree than those software projects that are centralised within one firm. With more programmers contributing changes to the FLOSS software project, production and maintenance of the software can grow more efficiently and rapidly. These contributions can take the form of fixing bugs, developing new features, or increasing functionality in some other way. Because the labour of FLOSS programmers contributes to the creation of digital commons, an analysis of their labour processes can be understood within the context of theories about communication labour, digital labour, or free labour, albeit with certain distinctions.

2.1.2. Communication Labour, Digital Labour, and Its Social Reproduction

A critical understanding of capitalist production, and particularly its consequences for labour, is useful for understanding the ways that information and

communication technologies (ICTs) operate today. Political economists of communication have called for increased attention to be paid to communication labourers (McKercher and Mosco, 2007; Mosco, 2006). Communication labour encompasses a wide variety of labour, including those who work directly in various media industries (i.e. television, film, music, video game, and software industries, etc.), but it also includes various types of knowledge work, digital labour, and types of free labour (McKercher and Mosco, 2007; Scholz, 2013; Lazzarato, 1996; Terranova, 2004).

The terms 'immaterial labour' and 'digital labour' have found increased currency in debates about online life. FLOSS labour can be viewed as a form of 'immaterial labour' insofar as the final products of work are 'immaterial products such as knowledge, information, communication, [or] a relationship' (Hardt and Negri 2004: 108). The term 'immaterial labour' was first introduced by Lazzarato (1996) and has since been debated by critical scholars.[9] Similar debates have occurred within critical scholarship circles about the nature of 'digital labour' (see Scholz, 2013). The primary concern in these debates has been with the nature of work and labour within the information, knowledge, and communication industries with a focus on forms of unpaid labour occurring online (see Andrejevic, 2007, 2012; Fuchs 2012). In these cases, users' online behaviours are tracked and can be transformed into an audience commodity in the same way that Dallas Smythe (1981) identified with broadcasting. Whereas Smythe argued that media programs constitute a 'free lunch' for producing audiences for advertisers, the same occurs online where companies and others seek the attention of users while data is collected about users' browsing habits. As most of us spend an increasing amount of time online during both work and non-work time, our digital labour – 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, 2011a; McGuigan and Manzerolle, 2013; Turow, 2013).

The capture of labour value online is certainly not coincidental. Schiller (1999) frames the emergence of 'digital capitalism' within the context of neoliberal policy, which viewed digitally networked technologies as a way for expanding marketing opportunities across the globe. As such, digital technologies function merely as another way to expand capital's reach across time and space, while decreasing the amount of time necessary to send and receive information about markets. The tendency of capitalism to seek the 'annihilation of space through time' (Harvey, 1989: 205) is a familiar one, and one in which communication technologies are often employed. For example, these tendencies can be traced back to the networking of the world with telegraph cables and continues today as fibre optic cables are stretched across oceans, which provide the infrastructure for the global Internet (see Winseck and Pike, 2007; Winseck, 2017). This infrastructure provides the material basis upon which forms of digital labour and massively decentralised collaborative production

can occur. This infrastructure is precisely what enables the massively decentral-
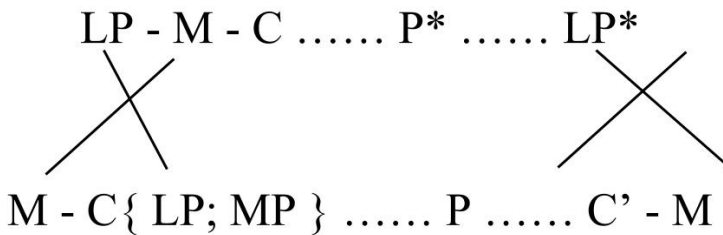ised and collaborative production occurring within FLOSS production.

While FLOSS production might be framed as digital or immaterial labour
insofar as it is involved in the production of immaterial products like software,
the exploitation of FLOSS labour occurs at two distinct points in the labour
process, each of which has certain qualitative differences. On the one hand,
FLOSS labour is exploited in a traditional Marxist sense of exploitation when
FLOSS programmers produce software that becomes commodified by corpora-
tions. In this scenario, many (but not all) FLOSS programmers may be unpaid
for their labour, meaning that the corporation selling FLOSS programs appro-
priates all surplus value created by the programmers. This type of unwaged
labour involves the appropriation of surplus value produced by FLOSS labour
in the process of producing commodities. The processes of commodifying
FLOSS projects will be explored specifically in the chapter on Red Hat, as it will
demonstrate how the company transformed free software into a marketable
commodity that could be customised and sold to clients. On the other hand,
FLOSS labour is also exploited in ways similar to other forms of digital labour
like those discussed above. For example, GitHub is the largest host of software
code in the world and provides one of the primary online platforms for produc-
ing software projects. In the course of producing FLOSS projects, the code for
those projects may appear on GitHub. While GitHub does not directly sell data
about its users, its privacy policy does indicate that 'other third parties, such as
data brokers, have been known to scrape GitHub and compile data' about user
activities on the site. This suggests that any FLOSS production occurring on
GitHub may potentially be exploited through the appropriation of value cre-
ated by online activities as a form of digital labour.

There is also a compelling question as to whether FLOSS labour is alien-
ated from the products of its labour. Even though FLOSS labourers may make
small contributions to FLOSS projects based on their unique expertise, there
is a certain degree of 'ownership' – or at least a claim to stewardship of FLOSS
projects – that is maintained by the community of developers over time. In fact,
this is what often engenders a sense of community within FLOSS development,
which is sustained over time by an association of developers who wish to see
the long-term survival of their project. In this sense, if FLOSS labour can be
said to be alienated from their production, it is at least qualitatively different to
more classical forms of industrial production.

Of course, all FLOSS production is also dependent on the ability of FLOSS
communities to reproduce themselves and their capacity to labour over time.
Similarly, the object of their labour – the FLOSS project – must be reproduced
over time, which requires not just the direct maintenance of the software pro-
ject, but also the reproduction of the labour power of FLOSS programmers.
Capitalism has always relied upon unwaged labour to ensure not only its own
reproduction, but also the reproduction of the labour power of workers. In this
sense, the feminist critiques of Marx that emerged in the 1970s (Dalla Costa and

James, 1975; Cox and Federici, 1976; Federici, 2012) are particularly valuable for understanding FLOSS production because they demonstrate how circuits of both capital and commons production are sustained by circuits of social reproduction. Moreover, those critiques are also useful for understanding the ways in which capital increasingly encroaches on aspects of everyday life.

The relationship between circuits of social reproduction and capital accumulation circuits can be visualised in the following way.[10] In Figure 2.1, the top line represents a simple illustration of reproduction circuits, and the bottom line represents the circuit of capital accumulation. In reproduction, money (M) obtained in exchange for labour power (LP) is used to buy commodities (C), which need to be processed by additional labour (L*). This process takes place outside of formalised working relationships (i.e. waged labour) and enables the reproduction of physical and psychological labour power (LP*), which can then be sold again to capitalists. Within FLOSS production, the cycle of unwaged reproduction can be applied in a couple of ways. First, there is a general process of social reproduction whereby FLOSS programmers reproduce their labour power over time by purchasing food, clothing, shelter, etc. and all those commodities that are required to reproduce the programmer's labour power. But there are also other ways in which the cycle of reproduction can apply to FLOSS labour. As I have already explained, a good deal of FLOSS labour is unwaged or takes place informally outside traditional forms of waged labour. Some of the specific dynamics at play here will be explored in greater detail in subsequent chapters, but one form of unwaged labour that could apply here is student labour. Money (M) could be expended by a student for additional education

$$LP - M - C \ldots\ldots P^* \ldots\ldots LP^*$$

$$M - C\{ LP; MP \} \ldots\ldots P \ldots\ldots C' - M$$

LP = Labor Power	*Top line represents circuit of reproduction
LP* = Reproduced Labor Power	*Bottom line is circuit of capital valorization
M = Money	
C = Commodity	
P = Production	
P* = Reproduced Production	
MP = Means of Production	

Figure 2.1: Coupling Between Production and Reproduction Circuits (DeAngelis, 2017: 189)

(C), which may be used to gain additional skills. These additional skills could then be used to increase the student's capacity to labour in the future (LP*).

In sum, FLOSS labour can be understood as a form of digital labour and contextualised within the rise of digital capitalism. That said, FLOSS labour has certain unique characteristics that make it more conducive, perhaps, to understand FLOSS labour as a more traditional form of labour, which was analysed by Marx. In this sense, FLOSS labour can be understood dialectically between continuity and change, whereby some of our existing understandings of labour in general continue to apply to FLOSS labour but other aspects require further elaboration. Primarily, this consideration stems from the question of whether FLOSS labour is alienated from the products of its labour in the same way that Marx described. After all, the community does maintain a certain degree of 'ownership' of their software insofar as the specific licence applied to the software allows them to retain ownership. However, even in these cases we have examples of where the wishes of the community were violated by a sponsoring corporation. Furthermore, there is also the question of the wage labour relationship between capital and labour within FLOSS communities, as not all FLOSS contributors are waged by a sponsoring corporation, but some are. This further complicates our understanding of how exploitation operates in FLOSS labour. At the very least, we may need to temper existing theories of digital labour to account for the qualitatively different ways in which labour is exploited by capital, particularly as it concerns the production, maintenance, and application of digital technologies.

2.2. Critical Theories of the Digital Commons

The preceding sections established frameworks for comprehending the ways in which FLOSS can be understood from a critical political economic perspective, including the ways in which FLOSS labour can be exploited by capital.[11] This section begins to outline the contours of a critical political economy of the digital commons. The goal of a critical political economy of the digital commons would be twofold. First, the project would illuminate the structural dynamics and power differentials that exist within commons-based communities, as well as the ways in which commons-based movements intersect with capital circuits. Second, the project would move beyond merely developing an analytical framework for understanding these power dynamics by developing a progressive political framework that could serve as a direction forward for a critical praxis of the digital commons.

As it concerned the analytical project, the previous chapter discussed different approaches for understanding the digital commons, which was aided by the frameworks developed by Broumas (2017a; 2017b). Within that framework, we positioned Ostrom within a *resource-based* understanding of the commons, and Benkler (2006) was most closely associated with the *relational/*

institutional approach. Similarly, in Broumas' (2017b) distinction between social democratic theories and critical theories of the intellectual commons, Benkler was positioned within the social democratic category. However, Benkler's work may not be so easily classified; there are times where his approach is much more conducive to a *processual* understanding of the commons. Benkler's concept of commons-based peer production contains the possibility of two useful contributions to a critical political economy. First, he discusses the ways in which commons-based peer production can alter our understanding of the relationship between communities of production and capitalist firms more generally. Second, however, commons-based peer production also focuses attention on the active production of the commons, thereby drawing attention to the labour processes involved in the creation, maintenance, and stewardship of the commons.

The analytical project of a critical political economy of the digital commons would build on the processual or dialectical understanding of the digital commons. According to Broumas (2017a), this approach frames the commons as 'fluid systems of social relationships and sets of practice for governing the (re) production of, access to, and use of resources' (1509). This definition draws attention to the social relations that are produced and reproduced alongside the relationship to the commons. Linebaugh (2008) frames this active creation by using the verb 'commoning'. In describing the practice of commoning, Linebaugh outlines four characteristics of commoning:

1) commoning is 'embedded in a particular ecology with its local husbandry';
2) it is 'embedded in a labour process' that exists in a particular field of praxis;
3) it is collective; and
4) it is 'independent of the temporality of the law and state' (44–45).

Commoning is therefore not just about understanding commons as resources but about the active pooling of common resources with a deep connection to the history, culture, and ecology of the place where they exist. As such, commoning is imbued with a complex relationship between subjectivity and the objects (i.e. common resources) to which those subjects relate. Broumas (2017a) explains that in this type of relationship 'the community itself is constantly reproduced, adapting its governance mechanisms and communal relationships in the changing environment within and outside the commons' (1509–1510).

This framework helps us to understand the commons and the complex interplay of subjectivity and community that is at work within commons-based communities. Massimo De Angelis (2017) has also developed an analytical framework for understanding how value is created and circulates within commons-based communities. He outlines this in his presentation of the commons circuit of value. This framework is also useful for understanding how commons circuits of value intersect with capital accumulation circuits.

2.2.1. Commons Circuits of Value

By combining systems theory (Luhmann, 1995), cybernetics (Maturana and Varela, 1998) and Marxist-feminist political economy (Marx 1906; Dalla Costa and James, 1975), De Angelis's task is to demonstrate how the commons can be understood as a system capable of bringing about a social revolution through ongoing iterations of commoning activity that are reproduced over time. Rather than arguing that such a revolution is imminent, however, he takes an epochal approach by focusing on how an emergent alternative value system like the commons has the potential to bring about a change in social relations. Just as capitalist social relations and subjectivities emerged in the feudal era, De Angelis views the commons as a similarly emergent value system responding to the excesses and exploitative tendencies of capitalism.

In the analytical portion of this work, De Angelis (2017) attempts to analyse the commons in the same way that Marx analysed capitalism. This leads him to develop a circuit of commons value, which accounts for the component parts of commons value systems. The circuit can be seen in Figure 2.2 below. In the circuit, an association of people (A) claims 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 – as subjects – and their commonwealth – as objects – constitutes the commons (Cs). Then, through the activity of commoning (cm), which is derived from Linebaugh's (2008) definition of the term, the commons are reproduced over time. Framing the commons this way not only adds to a growing corpus of scholarship that makes similar claims (Dyer-Witheford, 2006; Hardt and Negri, 2009; Ryan, 2013; Gutierrez-Aguilar, 2014; Singh, 2017), but it also adds critical weight to commoning practices by demonstrating how those activities are capable of bringing about a postcapitalist future. Commoning, therefore, includes the reproduction of both the objects that comprise the commons as well as subjectivities in which mutual aid, care, trust, and conviviality are reproduced over time. For De Angelis, this commons circuit can couple with capital circuits through the commodity form. His argument is not that these two can and ought to peacefully coexist, but that they do 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
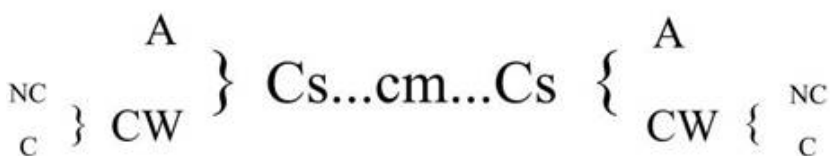
$$\begin{matrix} & & A \\ NC & \} & CW \\ c & & \end{matrix} \Big\} \ Cs...cm...Cs \ \Big\{ \begin{matrix} A \\ CW \end{matrix} \Big\{ \begin{matrix} NC \\ c \end{matrix}$$

Figure 2.2: The Commons Circuit of Value (De Angelis 2017: 193)

necessary to reproduce the commons and themselves over time. As this relates to the digital commons, a free software contributor or user still needs to have access to a computer to code the digital commons or to have access to them. In addition, the programmer will also need to have access to food, water, shelter, and all those things necessary to reproduce her 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 of commoners and will vary depending on the specific needs of the community.

This framework is useful for understanding the ways in which FLOSS communities relate to their digital commons. Various associations of programmers contribute to the production and maintenance of FLOSS projects, which are reproduced over time through commoning activities. The practice of commoning is a form of work that is necessary to sustain the commons over time. However, it only becomes a form of digital labour in certain circumstances. Braverman (1974), for example, draws a distinction between work and labour by explaining that work is a 'purposive action, guided by intelligence' that alters materials to improve their usefulness (49). But work becomes labour when the conception and execution of work are separated. In other words, ideas about what work is necessary can be performed by another (Braverman, 1974: 51). It is in this relationship that the division of labour occurs, which is foundational to capitalist accumulation.

At times, FLOSS communities intersect with capital circuits of accumulation when their projects are either sponsored by a corporation or a corporation incorporates a FLOSS project into their commercial offerings. As will be demonstrated in the subsequent chapters, capital exploits both the subjective qualities of FLOSS labour (e.g. collaboration, creativity, autonomy, sharing, etc.) as well as the specific objects of FLOSS labour – software that can be incorporated into commercial offerings. For example, Boltanski and Chiapello (2005) demonstrate how capitalism constantly reinvents itself by incorporating its critiques, whether they are social, aesthetic, political, or economic, into something that becomes desirable, which they refer to as the 'new spirit of capitalism.' However, despite the fact that capital attempts to encroach upon the digital commons, FLOSS communities maintain ways of negotiating and restricting access to their commonly held resources. This is particularly useful when a corporation attempts to transform the commoning activities of FLOSS programmers into labour as an input for the corporation. One of the primary means for negotiating this relationship between the community and the corporation is the establishment of 'boundary organisations'.

The concept of a 'boundary organisation' was developed within organisational theory by O'Mahony and Bechky (2008) to refer to an organisation that is set up to negotiate and establish boundaries between two parties who may have both shared and disparate interests. In effect, the organisation is

established to set the terms of the relationship between two parties. Within FLOSS communities, for example, the community will want to preserve their software project while also attracting other developers to the project. The community will also want to do this while retaining rights to the software and not ceding too much control or influence to a corporation. The corporation, on the other hand, will want to use the software for commercial purposes while also asking the community to develop certain features or fix certain bugs in the software. These interests may be mutually beneficial to the community and the corporation, especially as it concerns developing effective software. However, the relationship may break down if the community feels as though the corporation is attempting to influence their activities too much. The loss of creative autonomy would almost certainly violate the norms of the FLOSS community. The specific dynamics of these types of relationships will be borne out in the subsequent chapters.

2.3. Summary

This chapter framed the study of FLOSS production within a critical political economic framework. Such an approach focuses on the ways in which corporations wield power over communication resources. Drawing from Marx's dialectical understanding of labour and capital, critical political economy focuses attention on the struggle by labour for control over communicative resources in order to bring about a more just and democratic future. As it concerns digital technology, critical political economy rejects an interpretation of digital technology as purely innovative or revolutionary, and responds by refocusing our attention on the specific cultural practices and collective labour that make up both the technology and its attendant practices.

In addition, I positioned the collective labour – or commoning activities – of FLOSS communities as the primary source of their value. This is precisely what makes FLOSS projects an attractive option for corporations because they seek to harness this labour power to supplement their overall pursuit of profit. Given these two competing circuits of value – capital accumulation circuits and circuits of commons value – there exists a tension between capitalist firms, on the one hand, and FLOSS communities on the other. Therefore, how these two forces negotiate their relationship becomes a site of struggle and contention. At times, this relationship can be mutually beneficial and can help ensure the growth, sustainability, and attractiveness of FLOSS projects. However, at other times, this relationship can break down as capitalist firms attempt to encroach on the digital commons of FLOSS communities in various ways. The following chapters provide detailed descriptions of how these dynamics have taken shape over time. I begin with an historical discussion of the Microsoft Corporation and competing models of software production. Next, I demonstrate how Red Hat, Inc. successfully harnessed the power of the free software community to

build the largest and only publicly traded corporation whose business model is entirely dependent on free software. Finally, I focus on the Oracle Corporation's acquisition of Sun Microsystems, and what happens when a corporation exerts unwanted influence in FLOSS projects. Furthermore, I explain how the FLOSS community coped with that unwanted influence.

Notes

9 For a critique of 'immaterial labour' as an analytical concept, see Sayers, 2007.

10 This illustration and its description is adapted from DeAngelis, 2017: 189–190.

11 Certain portions of this section appeared in an earlier article: Birkinbine, Benjamin. 2018. Commons Praxis: Toward a Critical Political Economy of the Digital Commons. *TripleC,* 16(1): 290–305. Available via open access from https://www.triple-c.at/index.php/tripleC/article/view/929