The Political Economy of Communication
11(2), 4–23

http://www.polecom.org

On Open Standards and Proprietary Infrastructures: Continuous Integration and Regulation through Capitalist Enclosures

Tobias Stadler, University of Oldenburg, Germany

Keywords: digital capitalism; enclosures; infrastructure; subjectification; protocols

Abstract

Capitalism has constantly changed; it rebuilds and regulates itself through crises and struggles– digital capitalism is no exception. Often described as a historical break, its strategies and objectives are a direct continuation of all forms of capitalism prior. But the normalisation of networked devices, the datafication of everyday life and the privatisation of digital infrastructures offered capitalism a new mode of regulation built around enclosures. The recent histories of open digital protocols and standards like `XMPP` and `activityPub` illustrate the logics of platformisation, centralisation and exploitation which guide the current enclosures. This article sketches the arrival and enforcement of a new digital capitalism. With reference to the modern tools of "corporate cloud orchestration" and "configuration management", I show that the logics of capital accumulation are not fundamentally changed by digital capitalism but are reconfigured and rearranged to fit specific purposes.

Modern server infrastructures are continuously upgraded, rebuilt, rewritten, adapted or optimised. Any institution hosting their own servers today hardly ever has a physical piece of equipment in their basement anymore. Instead, they rent highly abstracted resources like processing time, storage space or bandwidth in discreet units, billed after usage. Creating a network of such virtual machines enables them to build systems automatically scaling up and down, depending on variable demand [1]. Cloud Engineers and DevOps technicians build them following a paradigm called "infrastructure as code". Here, they write actual text in a specific syntax into configuration files, often identified by their file ending `.conf`, which are then processed and deployed by "orchestration"- and "configuration-management" software. In what is called a "continuous integration/continuous deployment" (CI/CD) pipeline, several programs in sequence first connect to a cloud infrastructure provider to order resources via their API (Application Programming Interface). The resulting virtual machine is then set up by installing and configuring any software needed in order to finally integrate it into the existing network. The point of these pipelines is to seamlessly deploy changing code into running systems, so new patches and updates do not interfere

with ongoing processes. They also enable systems to dynamically respond to changing requirements. If something like a surge of user activity happens, such hyperscaling systems can automatically allocate new resources to adapt to the new conditions, which will stabilise the cloud environment [2].

In this article I will analyse moments of enclosure and subsumption as crucial parts of digital capitalism's continuous reconfiguration. Following the model of cloud-based orchestration systems, I will take a look at the way digital capitalism manages and orchestrates resources (from machines and infrastructures to labour, communities and knowledge), configurations (from production processes to spaces and subjectivities) and networks (from circulation, to computers and ideologies). After a short discussion of some theories of digital capitalism and Marxist theories of enclosure, I will address the enclosure and subsumption of the social in regard to commercial social networking platforms.

Capitalism as a social order and mode of production is plagued by regular crises, both internal and external. It is therefore in constant need of continuously implemented changes. While most changes are small and seem inconspicuous, others are more obvious and involve ruptures and transformations. Analysing the patterns of capitalist reproduction shows that the transformation to digital capitalism is not simply a historical break, but also a continuation and an update of capitalism's logics. Regardless of how many changes were made to its `.conf`-files.

Outside, behind or beyond capitalism?

Most accounts of digital capitalism offer a theory of how this regime emerged and a narrative of transformation which often includes specific forms of capitalist enclosure. The process whereby a new phase of capitalism comes into view is termed by critical technology scholar Jathan Sadowski as "terraforming". This evokes the science fiction theme of transforming barren planets into hospitable surroundings: "[Terraforming] is directed at creating conditions for a specific model of human life that is engineered according to the imperatives of digital capitalism. In the process, it also changes how people live in and interact with their environments" (Sadowski, 2020: 52).

While Sadowski develops a theoretically founded and critical perspective on the emergence of digital capitalism, others use the concept more loosely or colourfully. Early usages of the concept include that of Dan Schiller (1999), who described how network technologies uniquely generalise the economic and social logics of capitalism, and Nick Dyer-Whiteford (1999), who used it to move Negri's operaismo analysis forward. But the phenomenon has been widely discussed under various different names before and after, from Alvin Toffler's "information society" (1980) to Ursula Huws' "cybertariat" (2014). A related, widely adopted concept is Shoshana Zuboff's "surveillance capitalism" (2019). Initially coming from the field of management studies, Zuboff offers an account of what she calls the "void" between the need for individual determination and the actual lack of control over one's circumstances of living. She then describes how various tech firms used emerging new technologies to fill that void with personalised forms of consumption, like Apples iTunes or Amazons book recommendations. Actual surveillance capitalism later came into being, encapsulated by the fact that one engineer at Google had the idea to use the server logs—what she describes as "data exhaust" of people using the search engine—to not only improve search results, but also to personalise ads, and to predict and influence people's behaviour. In Zuboff's tale though, it seems that surveillance capitalism began as one corporation starting to do bad things as a "rogue

mutation", driven by "novel economic imperatives" independently of the surrounding capitalist economy (2019: 11).

Other accounts take longer historical processes into consideration. Specifically, these include the hegemony of global, financialised neoliberalism installed since the 1980s (Dean, 2020), the enormous public funding for digital surveillance and security technologies during the "war on terror" in the 2000s, and the increasing civil unrest of the new social movements throughout the 2000s and 2010s (Tarnoff, 2022). In these contexts, the way was paved for a handful of platform corporations to dominate entire market sectors, often operating as monopolies in their field. Lax market regulations and strategic transgressions of labour laws enabled them to circumvent anti-trust laws and to externalise the risks of their operations onto their precariously employed workers. Government money flowing into private infrastructures and the research concerning new information-communication technologies offered platform corporations their material basis. Further, cheap money through venture capital and low interest rates enabled them to buy up potential competition.

Yet another strand of discussion around the emergence of digital capitalism describes it as a new form of feudalism (Deans, (2020). Other authors speak of "data colonialism". In this context, media scholars Nick Couldry and Ulises A. Mejias (2019: 340) describe the nebulous digital realm being framed as "terra nullis" through legal and philosophical frameworks, which ready the underlying natural resources for extraction and expropriation into the "social quantification sector". While their analysis of this changing economic regime is itself insightful, their description would work just as well without "colonialism". Terms like "enclosures" or "accumulation" could locate the same phenomena well within capitalism itself and avoid implied comparison to the atrocities of chattel slavery and colonial genocides.

Describing the expansion of capital accumulation logic into new spheres of life as a colonial process has a long tradition. The restructuring of social life according to disciplinatory factory rule as a consequence of real subsumption was termed by early autonomist Marxist Mario Tronti as an "inner colonisation" (1974: 36). The gendered logic of expropriating reproductive labour compelled the Marxist-feminist authors Veronika Bennholdt-Thomsen, Maria Mies and Claudia van Werlhof to describe women as "the last colony" of capitalism (1992). However, neither of these descriptions needs the term "colonialism" to describe the phenomenon taking place. Violent or ideologically normalised appropriation of value produced by (very often racialised and/or gendered) people has been a core part of capitalist accumulation in almost all of its historical stages, although in changing configurations. Silvia Federici (2004), whose feminism was also heavily influenced by autonomist Marxism, argued that this was the case for the patriarchal divisions of productive and reproductive labour as well as for the techniques of disciplining work forces. The same can be said for the cheaply produced resources and commodities flowing from global peripheries back to the imperial centres. A similar point is made by critical theorist Nancy Fraser, who talks about the difference between expropriation on the one hand—the unfree forms of labour, the value of which capitalism mostly appropriates without any compensation—and exploitation on the other—the waged labour, organised by contracts, which is often the main focus of orthodox Marxist analysis:

> I maintain that expropriation has always been entwined with exploitation in capitalist society; that even "mature" capitalism relies on regular infusions of commandeered capacities and resources, especially from racialised subjects, in both its periphery and its core; that its resort to them is not just sporadic, but a regular aspect of business-as-usual. (Fraser and Jaeggi, 2018: 44)

Both Federici and Fraser, while differing in aspects of their analysis, are part of a strand of Marxist thought which argues for the central importance of such "regular infusions". These analyses often draw upon Marx' writings on "primitive accumulation" and Rosa Luxemburg's work on capitalist economics. In both contexts, enclosures are necessary for capital accumulation. This perspective on the history and workings of capitalism enables us to look at its contemporary transformations without assuming a sharp break. Changing historical conditions bring forward new regimes of accumulation through innovation or struggle, depending on who you ask. Regardless, capital is acting and reacting to changing historical conditions in ways which are "terraforming" our world and social relations. By continuously reconfiguring its networks of production, its regimes of property and propertisation, while simultaneously rewiring its global circuits, capitalism evolves along with its own contradictions. Enclosures and subsumption are important strategies for the continuous integration of contradictions and the continuous deployment of new circuits of production, exploitation and power. In this context, one can analyse the CI/CD pipelines of digital capitalism.

The capitalist enclosure of digital sociality

There is an ongoing discussion among critical scholars about the nature of capitalism's transformations and enclosures, reaching back at least to Marx' chapter on "so-called primitive accumulation" in Capital I (1976). For him, primitive accumulation was the "original sin" of capitalism, initially establishing capitalist social relations and the capitalist mode of production. He notes at least five core moments in this process: (1) the violent expropriation and enclosure of collective resources and commonly owned land; (2) the creation and disciplining of the double free workers, free from any means of production and free to sell their labour power; (3) the normalisation of the commodity form as the common way of reproducing oneself and relating to others; (4) the states' legitimation and stabilisation of a new property regime through laws and violence; and (5) the violent colonisation of the "new" world to subsidise the metropolitan centers with cheap labour and resources from the new global periphery. Silvia Federici summarises this process as the concentration of capital and labour (in a response to the deep economic and political crisis of feudal Europe). She also appends an additional important aspect, the entrenchment of modern patriarchy as a gendered division of labour. Reproductive labour is split off into the private household sphere to provide capitalism with its means of social and generational reproduction (2004: 63).

While Marx probably conceptualised primitive accumulation as a singular—though long-lasting—event marking the beginning of capitalism, Rosa Luxemburg later argued something different. She showed in her works on capitalist reproduction and accumulation, how capitalism could not reproduce solely from within itself (1951). Instead, capitalism relies on the constant enclosure of non-capitalist territories, resources or modes of production to ensure the continuity of its "enlarged reproduction"—the actual accumulation of capital. Luxemburg illustrates this in several ways, from the necessary expansion of the market to realise the value of the commodities of a continuously expanding production cycle, to the often-fluctuating demand for labour, which could not be satisfied by the generative reproduction of the proletariat itself, even with the availability of an industrial reserve army. Even "in its full maturity", capitalism depends on "non-capitalist strata and social organisation", a dependency which "extends over values as well as over material

conditions, for constant capital, variable capital and surplus value alike" (Luxemburg, 1951: 365) [3].

If we follow Luxemburg's argument, Andrejevic's (2011) description of a new form of primitive accumulation begins to make sense. Along with other thinkers—Silvia Federici (2020), Massimo de Angelis (2001), Klaus Dörre (2021) and Nancy Fraser (2018)—he sees primitive accumulation as a recurring or ongoing process, regularly enclosing parts of our life and world which were not previously under the direct control of the accumulation process.

> Before agrarian capitalism and wage labour – on which it is based – where possible, private property rights over land had to be established, as well as a work force, which sells its labour force for subsistence. And before informational capitalism was possible, a system of private control over productive informational resources had to be established, as well as a bourgeois sociality, which leaves no choice but to subordinate oneself under the control over personal information, to get access to these resources in exchange. (Andrejevic, 2011: 37) [4]

Although the current enclosure of the social is only the newest in a long line of enclosures, it has specific and grave consequences in terms of how we interact with ourselves, each other and our communities. As the social and informational resources and infrastructures of our time are put under private ownership, the people depending on them are concentrated on just a few big platforms. User interactions on these platforms always involve the production of economic value for platform owners (Fuchs, 2014: 258). This is a core form of exploitation under digital capitalism. The social work of communication and interaction is centralised and turned into exploitable labour, producing data commodities (Stadler, 2022).

Two major objections have to be considered here: (1) Digital networks and their sociality have never existed "outside" of capitalism, since they were developed and built within the ideological framework of its subjects and institutions, often following specific economic and military interests, and (2) "the social" itself has always been enmeshed with the rationalities of the hegemonic systems it lives in, especially in capitalist societies.

But, if the social is already part of capitalist accumulation and information and communication technologies as developed under capitalism, how can it qualify as a form of "outside" to be newly enclosed? Here, I want to further examine the notion of enclosure by considering Marxist sociologist Klaus Dörre's concept of "Landnahme" [5], which builds on the already discussed writings of Marx and Luxemburg. Dörre describes a dialectical inside-outside dynamic which stabilises capitalism in times of crisis and transition, given it cannot fully reproduce itself from within itself (Amlinger, 2017). Since "land" not only refers to actual terrain, but also to non-capitalist forms of production, ways of life or even bodies of knowledge, there are many such externalities to be enclosed, while they are constantly and newly produced as well. Be it through expulsions like pushing workers into the industrial reserve army, or reaction to crises of the Fordist welfare state by taking big parts of social reproduction out of immediate class relations (structural unemployment), the contradictions of capitalist relations constantly produce their own "outsides" (Dörre et al., 2009).

As Nancy Fraser (2014) notes, this description still relies on the problematic perspective of what the "inside" of capitalist accumulation and exploitation is, namely contractual wage labour for the production of commodities. And this definitely is one core dynamic of capitalist accumulation, which may make it easy to describe irregular forms of re/production as the "outside". But this once

again obscures capitalism's inherent dependency on irregular forms of labour: they are not outside its domain but necessary for it to function. For this reason, Fraser suggests the terminology "foreground and background" and notes their dynamic boundaries, which shift with each historical phase of capitalism. It is in this context that we should understand the current enclosures and transformations. The implementation and enforcement of a new regulatory regime of accumulation, adjusted to the changed historical conditions, reacting to a multitude of crises and movements of resistance, reconfigures the boundaries between background and foreground, between productive and reproductive activities and between life and work.

In what follows, I will look at the various aspects of such boundary shifts in terms of enclosures. Here, platformisation very directly concerns the literal enclosure and expulsion of collective resources. The new property regimes over informational resources and social data are often codified in data protection laws, rather than specific property laws. There are many forms of centralising enclosures, from the monopolisation of specific markets to VC-funded "disruptions" and destructions of certain industries, to the creation of technological dependencies for sometimes whole nation states. I will mostly focus on the enclosure and subsumption of the social, accomplished by commercial social networking platforms. These new enclosures do not take the form of armed platform-bailiffs swinging their binary halberds, driving people off their digital homesteads. It is not even exclusively about taking existing resources away from people who have depended on them for a long time. Rather, major parts of today's digital enclosures work by shaping emergent social interactions, making them possible only in ways that benefit capital's imperatives. Initially, a core strategy for doing this was the enclosure of common resources through the privatisation of public infrastructure. The ownership, design and function of technological infrastructures are structuring forces which push on our social relations and play an important part in constructing our sociality and subjectivities.

Infra- and intra-structures

In the previously mentioned paradigm of infrastructure as code, small snippets of declarative code are used to deploy and configure computational resources without having to manually click through web interfaces, run remote terminal commands or edit configuration files on all those servers. One of the most used tools to declare and deploy such resources is actually called *Terraform*. It works with a dedicated list of "providers" of cloud resources, the most relevant being Amazon Web Services (AWS), Microsoft Azure, Google Cloud and Alibaba Cloud. When run, Terraform connects to these providers' application programming interfaces (APIs), orders resources like virtual machines and does some very basic configuration. This short snippet orders a very small virtual machine (`t2.micro`) from Amazon Web Services (`aws`) in their datacenter in Santiago, Chile (`us-east-1-scl-1a`), installs a basic Linux operating system (`debian-12-amd64-20230723-1450`) and gives it a name (`prodserv-f12`)

```
provider "aws" {
  region = "us-east-1-scl-1a" }

resource "aws_instance" "prodserv-f12" {
  ami = "debian-12-amd64-20230723-1450"
  instance_type = "t2.micro" }
```

Almost all companies offering online services use tools like Terraform to create their virtual infrastructure elastically, to scale it up and down, depending on the changing workload. And while the list of Terraform providers shows a long tail of small cloud infrastructure providers, the biggest 5 account for more the 81% of the cloud computing market, with Amazon alone having over 40% market share [6]. Most platforms we use, from Netflix to Airbnb or Slack, depend on infrastructure as a service. This means they don't own and use their own dedicated server-hardware, but instead rent virtualised resources provided by mostly a small handful of infrastructure providers. Nick Srnicek (2017) would call these infrastructure providers "meta platforms". Centralisation, enclosure and subsumption are their core strategies. But to further explore how our collective social infrastructures and resources were reconfigured and terraformed for digital capitalism's needs, we first need to understand how the material and legal basis for this enclosure was formed.

Ben Tarnoff (2022) showed in his history of the internet how the strategy of enclosure through privatisation unfolded. The physical infrastructure came first, as the publicly built and maintained cables in the ground and under the sea were sold or contracted to private corporations (as well as many of the backbones enabling global inter-networking). This occurred shortly after usage of the internet as a professional and private communication infrastructure had been increasingly normalised, mostly in public institutions like schools, libraries and universities. This political project of privatisation fitted perfectly into the neoliberal regime of the early 1990s. Legislators all over the world tore down the protections of the early internet against corporate absorption. Technological imaginaries of immaterial cyberspace and information superhighways ideologically obscured the plunder of public infrastructures, as more corporations pushed into the digital sphere, looking for new ways to generate revenue.

Next, the sweeping privatisations went "up the stack" (Tarnoff, 2022: 72). Since selling access to the internet was already divided up among relatively few internet service providers globally, the remaining fractions of capital in the field had to monetise other aspects of our lives in an increasingly digitalised world. After the bursting of the "dotcom-bubble" in the early 2000s, a seemingly new kind of corporate structure emerged: the platform. Using platform services cost users no money; they could be personalised and using them over time became increasingly mandatory (in order to actively participate in social, political, economic and cultural life). Christian Fuchs describes this effect as a form of "ideological coercion" (2014: 263). But after almost two decades of platforms dominating central aspects of our lives, they are still hard to define. This is no coincidence, as Tarnoff argues:

> By calling their services 'platforms,' companies like Google can project an aura of openness and neutrality. They can present themselves as playing a supporting role, merely facilitating the interactions of others. Their sovereignty over the spaces of our digital life, and their active role in ordering such spaces, is obscured. It's no exaggeration to say, then, that platforms don't exist. The word isn't just imprecise; it's an illusion. It's designed to mystify rather than clarify. (Tarnoff, 2022: 75)

This is how the enclosure of the social was ideologically obfuscated. While the materiality of our communication infrastructures was made invisible by cultural tropes of immateriality and cyberspace, the power of centralised commercial platform corporations was hidden behind vague descriptions, sleek interfaces and reflexively accepted terms of service. The culture, sociality, solidarity, connections and knowledge created collectively by users are represented by platform corporations as services which are on offer. Yet this is already just us. The unpaid but exploited

labour of our peers, our own dispossessed sociality, are mirrored back to us as a commercial, yet seemingly 'free' offering. Platform corporations control access to these social and informational resources while exploiting our usage of them through datafication [7].

In a technical sense, the platform-form is an important tool for enclosures. It leverages social network effects as well as technological design decisions to create centralised and exclusive systems—appropriately called "walled gardens", echoing the fenced-off pastures of Marx's historical primitive accumulation. As media theorist Anne Helmond notes, commercial social networking platforms (CSNPs) use a simultaneous motion of decentralising platform features and recentralising platform-ready data, thereby spanning infrastructures of capture beyond their immediate domain (2015) [8]. They spread their services and weave them into increasingly more aspects of our daily lives. The labour sociologist Moritz Altenried describes this "becoming infrastructure", as lying "at the heart of the strategy of many platforms" (2022: 154). They try to become an indispensable part of our lives, while centrally controlling social interactions within their infrastructures.

Centralisation is necessary for the process of capitalist production and accumulation, a stage of enclosure Marx described as "formal subsumption" (1976). While he was talking about the destruction of small-scale production within the homes of peasants to establish the early factory system, today's formal subsumption means the privatisation of public infrastructures and the destruction of open and decentralised networks to establish the closed data production system of the platform and the cloud. One example of such destruction is the XMPP/Jabber protocol, on which the infamous "embrace, extend, extinguish" strategy was used [9]. As an open and decentralised instant messaging protocol, XMPP/Jabber was widely established in professional, academic and activist settings during the 2000s. It was so common that both Facebook and Google initially based their instant messaging services on the protocol [10]. This promised interoperability with other servers using the same protocol, thereby offering their users an even wider group of people to interact with. But making content from their platforms available to people outside their networks obviously clashed with the two corporations' business interests. Facebook quickly turned off this interoperability, having used the protocol and its open-source ecosystem of apps and servers merely as a technical starting point for its own developments. But Google tried to leverage their control over personal email services to take over bigger parts of the XMPP/Jabber network. After combining instant messaging with their already dominant email service, they introduced more and more features incompatible with official implementations of the protocol, urging users of what they newly declared as "legacy apps" to fully switch over to their services and platform—and many did. When Google was by far the biggest node on the network, they announced the end of their interoperability. All users of the network faced a choice: either switch to Google or lose connectivity with the biggest parts of their professional, academic or activist networks. They were effectively forced to choose the proprietary messaging service, since the existing network—with all the work that went into building and maintaining social connections—was enclosed and is now controlled by the platform [11]. The XMPP-Network is still around, but it never came close to the same level of significance because Google succeeded in doing what it is still actively trying to do to the email standard or even the HTTP protocol.

Social re|production

The enclosure of our digital and social infrastructures puts the technological means of our sociality in private corporate hands. The way they are built is therefore not informed by the needs of a caring and democratic society but structured by the needs and imperatives of digital capitalism. Our devices are built to be sticky so that users spend more time producing data [12]. Our interactions are enabled only in ways that produce as much data as possible. And our attention is not guided towards the information necessary for participatory processes of cooperation, but towards engagement-enhancing advertisements. This is not because an evil handful of people are pulling the digital strings in the background; it is the consequence of the logic of capital accumulation. Intrusive surveillance technologies align with the interests of increasingly authoritarian state actors, as well as the economic interests of platform corporations. The impacts of the new regime of digital capitalism are not distributed evenly, as Jathan Sadowksi (2020) has shown. A capitalist patriarchy built on white supremacy has enabled intensified policing of racial minorities and a growth in gendered digital violence. This maps onto Silvia Federici's (2004) observation that violence against racial and gendered minorities often increases during times of enclosure.

But the enclosure of the social for the production of data does not only attack and destroy publics and communities, it also continuously produces them. When legal scholar Salome Viljoen (2021) writes about data, she advocates ditching the terms "personal data" or "private data" in order to speak of "social data" instead. In the latter context, she argues that a vertical data relation exists between a data subject and a data collector, i.e., the user and the platform they are using. This is an obvious relation—users are individualised by the contractual form inherent to the terms of service. This is also the relation that most data governance frameworks acknowledge and regulate. Datafication is framed almost exclusively as a problem of individuated harm or personal rights. In contrast, the horizontal data relation connects users together, mostly non-consensually. Groups of users sharing the same relevant population features are connected via their social data and may have shared interests through such connections. If data subject A and data subject B are part of the same statistical group, their decisions impact each other's life—not merely in a direct relation, but on a population level. If a significant number of cyclists in a certain region stopped wearing bike helmets, insurance premiums might rise for all cyclists there. Platform corporations and data collectors are specifically interested in such horizontal data relations and the potential for population level insights, even though they approach each user individually, such that only vertical data relations are acknowledged. As Viljoen points out,

> It is this relational value of data that drives much of the imperatives to data access, processing, and use. The distinctive feature of ML- and AI-based systems is that they can be used to know things about Adam that Adam does not know, by inferring back to Adam from A_n. And, of greater legal significance (or concern), data from A_n can be used to train models that 'know' things about Bn, a population that may not be in any vertical relation with the system's owner. This is the key shift of at-scale data analysis. (2021: 30)

The enclosed and subsumed social goes beyond the actual users within a platform. And the knowledge generated by data analysis not only enables economic predictions but reinforces control as an important form of power in authoritarian, neoliberal societies. Our sociality is not just enclosed for the production of surplus value, but also to enforce power over populations, as is the case with neoliberal social policy frameworks. Control is a regime of governance that works

according to certain parameters of normality and then refines this apparatus if spikes or deviations in the apparatus appear (Deleuze, 1992). While this arrangement seems to grant wide freedoms with a “near endless expression of individuality”, it also demands constant observability, “each subject must render him/herself open and exposed at all times” (Sadowski, 2020: 41).

Precarity and unpredictability are important aspects of neoliberal dominance, as they force people into actively managing every risk, while taking all their security nets away (Demirovic, 2013). The transformations in labour organisation through workplace surveillance and algorithmification demonstrate the process. Gig-working platforms, for example, actively prey on the people most affected by social insecurities and economic crises. Centralised data production has given capital a tool to manage such insecurities. In private hands, trend analysis and the predictive capabilities of large-scale statistical models effectively mean secure planning for capital, and insecurity and precarity for its subjects. For this reason, it is important to take both aspects of social reproduction into account: the material side and the ideological side. Capital not only needs specific material infrastructures, technologies and institutions for its accumulation to function, but also needs to produce specific outlooks, social relations and subjectivities. Both aspects contribute to the processes of enclosure.

Configuration management

Digital infrastructures are not just built by ordering virtualised Linux computers and linking them together. These virtual machines need to be configured: software needs to be installed; settings for their specific purpose have to be entered; credentials for internal networks have to be given, and so on. Before paradigms like infrastructure as code and continuous integration, configurations had to be done manually for each new server, while considering the quirks of differing pieces of hardware. Servers managed in this older way are now called “pets”, since you have to care for them individually and they grow over time (such that they often become hard to maintain). The shift to virtual cloud machines brought with it a shift from pets to “cattle”. The latter are created and destroyed on demand, get configured automatically and are virtually the same, since their hardware is virtualised and abstracted from the actual machine they are running on.

Over recent years, the corporate open-source software tool Ansible has become the industry standard for the task of configuration management [13]. It processes complex arrangements of text files in the `yaml` syntax to apply roles and perform tasks on a pre-defined inventory of servers. This includes things like installing software, changing configuration files or starting programs.

```yaml
---
- name: Legacy IP
  hosts: old_network
  remote_user: root

  tasks:
  - name: Disable IPv6
    ansible.posix.sysctl:
      name: "net.ipv6.conf.{{ item }}"
      value: '1'
    loop:
      - "all.disable_ipv6"
      - "default.disable_ipv6"
```

This is a basic example of an Ansible "playbook" with the title and description "`Legacy IP`", which connects to all servers in the group `old_network` and performs a single task. It uses the module `ansible.posix.sysctl` to disable all IPv6 functionality on those servers by setting the system control variables `net.ipv6.conf.all.disable_ipv6` and `net.ipv6.conf.default.disable_ipv6` to the value `1`, which means "yes" or "true". Through using combinations of modular playbooks and dynamically targeted tasks, Ansible enables system administrators to configure vast arrangements of diverse servers declaratively and later monitor and correct any unwanted configuration changes. Using infrastructure as code, the way those servers work together and interact with each other is declared and managed centrally as they are monitored.

Configuring and reconfiguring processes, spaces and subjectivities is also a core aspect of capitalist enclosures. Since digital capitalism's imperative is to force its actors to constantly increase the production of data, these production processes need to be optimised and reconfigured. And when further enclosures become more difficult to establish in an increasingly saturated and monopolised market, the next best option is intensification. I have already introduced Marx's concept of formal subsumption, meaning the centralisation and control of the labour process, in regard to the enclosure of the social through the platform-form. Capital formally subsumes the production process "as it finds it" and then goes on to optimise the extraction of surplus value. The labour process is split apart, studied and reorganised, moving people further away from the object of their labour. This intensifies their alienation and minimises the last bit of real control over their own work and sociality. This is what Marx called "real subsumption of labour under capital" (1976: 645). That is the point when more and more forms of labour become part of the social process of production. To "work productively" now, it is not actually necessary to stand in the factory oneself, but only to be "an organ of the collective labourer, and to perform any one of its subordinate functions" (Marx, 1976: 644). Marxist communication scholar Christian Fuchs takes up this concept of a "collective labourer" to develop his notion of exploited digital labour within corporate social networking platforms (2014).

Historically, the forms of affective, social and emotional work we see formalised within corporate social networking platforms were strictly gendered and often strongly coded as female. This brings Kylie Jarrett to introduce the figure of the "digital housewife", whose work is "simultaneously inside and outside of capitalism" (2016: 67). What Jarrett discusses is mainly "consumer labour", sometimes called "playbour" or just "digital labour", but she places this in a wider context already discussed earlier by feminist Marxist scholars. The "housewifisation" or "feminisation" of all work occurs as it becomes increasingly precarious and demands both flexibility and adaptivity, as well as emotional availability (see e.g., Bennholdt-Thomsen et al., 1992). Such work now gets organised for the production of social data while being "a site of social reproduction". As Jarrett notes, it is "a site for the making and re-making of the social, affective, ideological and psychological states of being that (may) accord with appropriate capitalist subjectivities" (2016: 71).

This work is unpaid and invisible, like reproductive housework. And it is turned into productive labour for capitalism as well. It plays on our desires to be part of the social and refracts this exploitation back at us as friendship. The artist Laurel Ptak (2014) notes this in her remix of the 1970s manifesto "Wages Against Housework", which Ptak calls "Wages for Facebook". It begins with: "They say its friendship. We say its unwaged work.". Cultural critics Mareile Pfannebecker and James Smith similarly argue that "by farming our desires, capitalism not only gets free

housework and free data, it also produces subjects who relate to themselves as commodities, online and offline" (2020: 75).

Many thinkers of the post-autonomist tradition have used the concepts of real subsumption, the collective labourer and social production to argue for the notion of a completely new social factory, where all forms of work became part of capitalist production. Authors such as Tiziana Terranova argued that capitalist relations were directly reorganising our daily social lives, especially through the technological advancements of digitalisation (2014). Here, Kylie Jarrett remarks that some "interpellation of subjects oriented towards the particular kinds of work-relations associated with capitalism is therefore necessary to the grounding and continuity of the capitalist mode of production" (2016: 55). This has always been the case, she argues, and did not start with the emergence of some new form of immaterial labour under digital capitalism [14]. Recognition of the historical continuities of real subsumption and capitalist subjectification need not disregard the reconfigurations associated with the transition to digital capitalism. The point of a term like "digital capitalism" is to denote an historical phase of capitalism with its distinctive configurations of material infrastructures, subject compositions and ideological subroutines.

Real subsumption and capture

Subjectification describes the creation of subjects, of people conforming to the needs of capitalism, both through their consciousness, their views, thoughts and habits, and through their bodies, their material relations and their positioning within the arrangement of infrastructures and institutions. In his notion of subjectification through interpellation, French Marxist Louis Althusser points out the modes of recognition involved. This includes the subject being recognised and called out to by the structures of power (among other subjects) and the subject recognising itself as a subject. Through this process, ideological frames move into the subject, as it recognises the interests of power as its own and acts accordingly. Producing such subjects and ensuring their consent to the relations they find themselves in is central to stabilising the shifting relations of production. In this sense the reproduction of the relations of production is about producing people who acknowledge "what is" as "what should be" (Althusser, 2014). Ideally formed subjects recognise their societies as normal, such that institutions and infrastructures can disappear into the background, only to become visible and exert their power as control if the continuously monitored parameters of the normal are exceeded (Deleuze, 1992). The normal becomes invisible.

In research on technological infrastructures, an often-made point is that functioning infrastructures become invisible, only appearing if broken or glitching (Star, 2002). Only the absence of cell phone reception reminds us of the network of radio masts across the country. App developers and designers talk in a strikingly similar way about the interfaces of their products. Thus, "the best interface is invisible" has become a standing mantra of theirs. This means that users should not have to think about using their apps and services. It should be completely normal or intuitive to interact with them. The trend of "habit forming design", with clues from addictive gambling machines, is a logical consequence of this paradigm [15].

Our apps call out to us – "What is on your mind, `$User_Name`?" The underlying infrastructures define the array of possible forms our social interactions can take, we are shaped with them, as we are by Althusser's state apparatuses (Lovink, 2016). Subjectivities are formed by the interests and imperatives of tech designers, maintainers and owners. We are trained to normalise technological affordances and their embeddedness in our daily lives. Digital technologies disappear in the

ideologically formulated normal of our existence within digital capitalism. Their boundaries of control turn the ideology of capitalist societies into taken-for-granted material experiences.

These observations underscore a common theme in critical data studies: the datafication of our lifeworld is not a passive process of silently recording what we do. The enclosure of the social, the real subsumption of our social interaction, is an active process of reconfiguration. Social lifeworlds are rendered parsable for automated systems, among other things. With his concept of "capture", computer scientist Philip Agre spelled this out 30 years ago (1994). He distinguished capture from surveillance, since the latter mostly concerns secret, visual operations such as the hidden spy camera in your corner, monitored by an agent of your state's secret police. Capture, on the other hand, operates with linguistic metaphors, formulating "grammars of action", within which the newly formalised and formatted process has to function. These grammars are enforced through both ideological and technological means and ensure that the captured people and processes are parsable for automated screening systems.

Philip Agre's use of the word "capture" gestures towards its double meaning: it refers to trapping or catching data as the input of a system yet also means grasping or understanding the semantic notions of an object in a certain state (1994: 106). In regard to the first meaning, capture infrastructures need a wide net of sensors to surveil and record the acting subjects and their states within their field. The second meaning of "capture" demands both a data model fitting the process and the strict enforcement of this process. Data model here refers to a set of categories and relations in a database which can represent all the desired aspects of the process, e.g., the various stages of a production or sales process. The strict adherence to this process within the logics of the data model needs to be enforced, be it through social norms like workplace regulations, the design of machinery and interfaces or through things like written scripts for support calls or sales interactions. In the context of real subsumption, it is therefore important for digital capitalism to reconfigure the spaces of digital sociality, defining the possible ways of interaction in specific grammars of action and finally to form subjects wanting to adhere to these grammars and capture infrastructures. The ways in which people interact within commercial social networking platforms are only valuable, if they fit into the specific data models of these platforms – and their interfaces and protocols make sure they do. The production process for social data gets optimised in this way, turning friends into users and conversations into content.

Just as the neoliberal regime allows for, and actually encourages, a wide set of expressions concerning individuality, the grammars of action shaped by digital capitalism's capture infrastructures allow for many forms of sociality—from our family chat groups, to handicraft group discussions on specialised forums, or to mere physical movements in video-surveilled public places. As long as our expressions stay within those grammars, they are parsable for the production of social data.

Within social networking platforms, social interaction is mostly made possible within frames of competition and consumption, nudging users to relate to themselves and to others as if they were commodities. The grammars of action within digital capitalism's social spaces are shaped by exploitation and commodity production. This is part of the updated normalisation of the commodity form as the common way of reproducing oneself and of relating to others. But the statistical methods deployed by platform corporations on the vast amounts of social data produced by their users, enable them to further use these users as actual commodities. Through what Birch, Cochrane and Ward (2021) describe as "techcraft", platforms regularly assetise user engagement and access to users—made parsable by capture systems—rather than the actual social data itself. This is enabled

when states legitimise and stabilise digital capitalism's new property regimes through legislation and enforcement. The past decades' programs of neoliberal privatisation of public infrastructure and welfare laid the material and social base for the following enclosure of the social. Even supposed protection legislation like the EU's GDPR has the stated goal of enabling and stabilising a market for social data, or rather its applications [16].

activityPub

At the end of their work in 2018, the "Social Web Working Group" at W3C, the main international standards organisation for the World Wide Web, put a question at the very top of their website: "Don't you miss the days when the web really was the world's greatest decentralised network? Before everything got locked down into a handful of walled gardens?" [17]. This question not only implies that enclosure is a pressing problem facing our current internet, but also a stand against the corporations currently configuring our infrastructures. The main output of the by now dissolved Social Web Working Group was the `ActivityPub` protocol, which aimed to transpose the structure and features of social networking platforms into an open and decentralised protocol. The continuously growing network forming around this protocol is referred to as the Fediverse and it is largely formed by servers using the protocol's best known implementation Mastodon.

The Fediverse's name gestures towards a federated network structure. Instead of one central complex of servers handling all the traffic as in commercial social networking platforms, there are many autonomous servers exchanging messages, likes, posts, profiles, etc. An account on one server can interact with accounts on other servers, just as I can send emails from my university's email server to people with mailboxes on other email provider servers. Even though Google and Microsoft are working hard to enclose it, this kind of architecture is still a decentralised, federated system.

In regard to the enclosures of digital capitalism, the decentralised structure of the Fediverse works against the consequences of formal subsumption. Avoiding the platform-form and its centralisation enables different servers in the Fediverse to build communities on their own terms. Self-determined rules and practices of content moderation make vastly different social spaces and communities possible. Public institutions as well as small server collectives create diverse ways to fund and maintain digital infrastructure.

The `activityPub` protocol works by sending "activities" comprised of a relatively small but extendable set of actors, activities and objects. Each exchange between two servers includes an actor doing an activity on an object: an account likes a picture; a server blocks a profile; a bot joins a group. This vocabulary builds a literal grammar of action, and unfortunately a well-known one. The continuities of real subsumption are visible all over the protocols vocabulary, as it opens mostly the same possibilities of social interaction developed for the optimised production of social data (Stadler, 2022).

Open protocols often turn out to be perfect tools for future enclosures. Just as Google was able to take over almost the whole `XMPP`/Jabber network, so did Slack and Discord enclose the biggest chunks of the `irc` network (neatly separating professional and recreational uses between themselves). Facebook/Meta is already positioning itself with the Threads app to do something similar to Mastodon, the Fediverse and the `activityPub` protocol. By connecting to a wider network via an open protocol, the platform corporation offers its users access to subculturally coded

niche communities and shields itself from regulators calling for them to open up their core networks (such as Instagram or Facebook).

The second biggest project in the social networking protocol space right now is Bluesky with its Authenticated Transfer Protocol (`atproto`). The company was started by Twitter's founder Jack Dorsey. The protocol does not actually federate yet, but the company already uses classic Silicon Valley tactics such as artificial scarcity to build up hype around their network. In its structure, `atproto` is built around small servers hosting the actual user data, while access to the actual network and other people is made possible only via centralised relays. These need a huge amount of processing power, since they need to crawl and distribute all the content of the network. This makes hosting such a relay only possible for a very few institutions with a very large amount of resources. Therefore, centralisation is built right into the structure of the protocol itself [18].

Ben Tarnoff points out that, "it's not quite accurate to say that the web was once open and now is closed – rather, it is the open parts of the web that make the closed parts possible" (2022: 173). This is true in the sense of enclosing existing standards, say, via strategies like "Embrace, Extend, Extinguish", by moving early into an emerging network or to gain influence on its further development and to steer this towards corporate interests. Other strategies include the creation of competing standards to open projects, rivalling their values while using the same language of openness. Corporations like Google and Meta liked to describe themselves as 'open' until very recently.

Whose `.conf`?

The structures of digital capitalism continually integrate challenges to its workings and deploy new configurations in the face of a multitude of crises, but this is increasingly costly. The reconfiguration of our social relations becomes more and more intrusive and dysfunctional, while the returns on capture and datafication seem to reduce. The fine-tuned and highly complex deployment and networking of resources have turned out to be brittle and unstable in the face of supply line challenges, conflicts and economic crises. An era of data accumulation may be coming to an end, notwithstanding the frenzied hype around AI.

I have considered various aspects of what I called the enclosure on the basis that enclosures are a continuously necessary part of capitalist accumulation. They actually have a double role, though. On the one hand, enclosures or processes of "accumulation by dispossession," as Marxist geographer David Harvey would call them, are a constant means for capitalism to stabilise itself. But at some points, they become the "dominant form of accumulation" and become vehicles for historic shifts in the broader regimes of accumulation (Harvey, 2003: 153). In my view, the enclosure of the social should be understood as such a historic shift and a means for asserting digital capitalism. The immense power of this new round of enclosures comes from the infrastructuralisation of digital capitalism's key players. Embedding themselves into all aspects of life and society is a core tenet of the platform-form. Therefore, addressing these infrastructures and their standards needs critical analysis and politicisation.

In his work on the politics of technology, the philosopher Langdon Winner made it clear that we cannot accord all the political and social implications of technological artefacts to "the interplay of social forces" (Winner, 1980: 123). Technology is not inherently neutral, and its politics are not just determined by their usage. He instead shows how some technologies require specific social formations to be implemented, while some others are at least strongly compatible with particular

social and political relationships. He additionally points out how "specific features in the design or arrangement of a device or system could provide a convenient means of establishing patterns of power and authority" and that the flexibility of such systems therefore gives the social actors who influence their design and arrangement immense power (Winner, 1980: 134).

The problem we are facing is not that technology and infrastructure form our daily lives and structure our social reproduction. This has always been part of how people, communities and societies reproduce themselves. Engineering scholar Deb Chachra has noted that "infrastructure is care at scale" (Chachra, 2021). She shows how infrastructures enable personal freedom by taking care of most of the basic needs of our bodies. But more importantly, she underscores how infrastructural systems collectively position us in relation to each other and connect us. This is not necessarily a good thing though, as our existing infrastructural networks and especially our global energy systems are not built with equality in mind. Instead, they "are largely built around the idea of localising the benefits to their consumers and distributing the harms.…Carbon dioxide in the atmosphere is allowed to go everywhere. People are not" (Chachra, 2021: para 22).

In the context of my arguments thus far, this suggests putting care at the center of how we want to build our technological infrastructures. Moving beyond the inevitability of technological progress in its current form allows us to open a democratic conversation about which technologies are wanted and needed. And a critical inquiry into how these technologies are configured and networked for the people and societies using them has to be part of that conversation. Staying with the logic of configuring our infrastructure declaratively, we need to ask—which configuration file is used, and which interests and imperatives are written into it. The question is: Whose `.conf`?

Author Bio

Tobias Stadler is a graduate researcher at the University of Oldenburg, Germany, where he is working on critical theory, digital infrastructures and the propertisation of data. He received his master's degree in media studies from the University of Vienna, Austria, and is currently working on his dissertation about alternative social networks within digital capitalism.

Endnotes

[1] In a very strict sense, the term virtual machine (VM) is often not fitting any more, since most cloud environments nowadays are built by orchestrating even smaller units and containers, sometimes called micro-service architectures.

[2] The company Red Hat was centrally important for the development of open-source software for corporate cloud infrastructures and was acquired by IBM in 2019. Their company blog offers a deeper explanation of CI/CD-systems and hyperscaling: https://www.redhat.com/en/topics/devops/what-is-ci-cd; https://www.redhat.com/en/topics/cloud/what-is-a-hyperscaler

[3] In this sense, Luxemburg's argument is a continuation of the phenomena described by the colonial imperative noted by Marx and the patriarchal division of labour noted by Federici.

[4] Original in German, translated by Tobias Stadler.

[5] The term was never translated satisfyingly, since the terms “land grabbing”, “land enclosure” or “land conquest” all have diverging connotations. Dörre himself uses the German term in his English writings (e.g., Dörre and Haubner, 2018).

[6] As reported by the consulting firm Gartner in July 2023: https://www.gartner.com/en/newsroom/press-releases/2023-07-18-gartner-says-worldwide-iaas-public-cloud-services-revenue-grew-30-percent-in-2022-exceeding-100-billion-for-the-first-time

[7] How data commodities realise their value can differ drastically. Direct sales are rare, but access to dossiers on individual people as a service of interest to financial institutions, insurance companies or “security” forces is increasingly common. The most common way to generate profit by utilising social data is through personalised advertisements. Increasingly though, social data is used to train generative machine learning models to later sell their capabilities as a service.

[8] Platform features can include sharing buttons, tracking beacons, development frameworks, authentication services, and so on. Platform-ready data can also take many forms, including social interactions, consumption choices, or location data.

[9] The phrase “Embrace, Extend, Extinguish” became synonymous with the strategy of tech corporations to use open standards and protocols to dominate potential competition. The strategy involves adopting a standard, then expanding on it with proprietary features incompatible with other software using the standard, and then finally abandoning the standard, positioning one’s own product as the next standard others should adhere to. The term came to light from Microsoft’s internal communication concerning an investigation from the US Department of Justice looking at the firm’s anti-competitive practices in the so-called “browser wars”: https://www.justice.gov/sites/default/files/atr/legacy/2006/06/01/V-A.pdf

[10] “Facebook Developer Blog: Using Facebook Chat via Jabber” from 2008: https://developers.facebook.com/blog/post/110; “Google Talkabout: XMPP Federation” from 2006: http://googletalk.blogspot.com/2006/01/xmpp-federation.html

[11] “EFF: Google Abandons Open Standards for Instant Messaging” from 2013: https://www.eff.org/deeplinks/2013/05/google-abandons-open-standards-instant-messaging

[12] “Sticky” websites or apps are designed in a way that compels users to spend a lot of time there and return regularly. The term is loosely defined but widely used, as this article from 2000 shows: https://www.computerworld.com/article/1359024/sticky-business.html

[13] While Ansible is open-source software, it is owned by RedHat, which was acquired by IBM in 2018. In early 2024, IBM also bought Hashicorp, the corporation behind Terraform. This means IBM now owns two of the most important and widely used tools for cloud automation and modern DevOps.

[14] The concept of immaterial labour brings with it several other problems for the analysis of (digital) capitalism. The description "immaterial" is questionable in itself, as all bodies and their social relations are very material.

[15] This concept of "Habit Forming Design" was partly popularised by the computer scientist Nir Eyal's book "Hooked!" in which he himself described this concept as inspired by the addictiveness of gambling slot machines (2014).

[16] Article 1(3) of the EU's General Data Protection Regulation (GDPR) states that "free movement of personal data within the Union shall be neither restricted nor prohibited" as one of the four core functions of the legislation. This effectively means the protection of the EU's internal data market.

[17] See https://activitypub.rocks

[18] Relays (formerly described as Big Graph Services) are described in the protocols specification: https://atproto.com/specs/atp#protocol-structure

References

Agre PE (1994) Surveillance and capture: two models of privacy. *The Information Society* 10(2): 101–127. DOI: 10.1080/01972243.1994.9960162

Altenried M (2022) *The Digital Factory: The Human Labor of Automation.* University of Chicago Press.

Althusser L (2014) *On the Reproduction of Capitalism: Ideology and Ideological State Apparatuses*. Verso.

Amlinger C (2017) Klaus Dörre: Die neue Landnahme [The new land grab]. In Kraemer K and Brugger F (eds) *Schlüsselwerke der Wirtschaftssoziologie.* Springer Fachmedien, pp. 471–480.

Andrejevic M (2011) Facebook als neue Produktionsweise [Facebook as a new mode of production]. In: Rohle T and Leistert O (eds) *Generation Facebook: Über das Leben im Social Net.* Bielefeld: Transcript, pp. 31–48.

Bennholdt-Thomsen V, Mies M and Von Werlhof C (1992) *Frauen, die letzte Kolonie. Zur Hausfrauisierung der Arbeit* [Women, the Last Colony. On the Housewifisation of Labour]. Rotpunktverlag.

Birch K, Cochrane DT and Ward C (2021) Data as asset? the measurement, governance, and valuation of digital personal data by Big Tech. *Big Data & Society* 8(1). DOI: 10.1177/20539517211017308

Chachra D (2021) Care at scale: bodies, agency and infrastructure. *Comment.* Available at: https://comment.org/care-at-scale (accessed 22 November 2023).

Couldry N and Mejias UA (2019) Data colonialism: rethinking big data's relation to the contemporary subject. *Television & New Media* 20(4): 336–349. DOI: 10.1177/1527476418796632

De Angelis M (2001) Marx and primitive accumulation: the continuous character of capital's 'enclosures'. *The Commoner* 2.

Dean J (2020) Neofeudalism: the end of capitalism? *Los Angeles Review of Books*. Available at: https://lareviewofbooks.org/article/neofeudalism-the-end-of-capitalism (accessed 22 November 2023).

Deleuze G (1992) Postscript on societies of control. *October* 59: 3–7.

Demirovic A (2013) Ist der Neoliberalismus Hegemonial? Gramscis Hegemoniekonzept und Sicherheit als Herrschaftsform [Is neoliberalism hegemonic? Gramsci's concept of hegemony and security as a mode of domination]. *Widerspruch: Beiträge zu Sozialistischer Politik* 32(62): 127–139. DOI: 10.5169/seals-651984

Dörre K (2021) Kampf um Öffentlichkeit. Kapitalistische Landnahme und die Zerstörung von Vernunft [Struggle for the public: capitalist land grab and the destruction of reason]. In: Borchers N, Güney S, Krüger U and Schamberger K (eds) *Transformation der Medien – Medien der Transformation. Verhandlungen des Netzwerks Kritische Kommunikationswissenschaft*. Westend, pp. 103–127. DOI: 10.53291/TMQO5163

Dörre K and Haubner T (2018) Land grab through tests: a useful concept for the sociology of work. In: Dörre K, Mayer-Ahuja N, Sauer D and Wittke V (eds) *Capitalism and Labor: Towards Critical Perspectives.* Campus, pp. 71–112.

Dörre K, Lessenich S and Rosa H (2009) *Soziologie − Kapitalismus − Kritik: Eine Debatte* [Sociology – Capitalism – Critique. A Debate]. Suhrkamp.

Dyer-Whiteford N (1999) *Cyber-Marx: Cycles and Circuits of Struggle in High Technology Capitalism*. University of Illinois Press.

Eyal N and Hoover R (2014) *Hooked – How to Build Habit-Forming Products*. Princeton University Press.

Federici S (2004) *Caliban and the Witch: Women, the Body and Primitive Accumulation.* Autonomedia.

Federici S (2020) *Die Welt wieder verzaubern: Feminismus, Marxismus & Commons* [Re-enchanting the World: Feminism and the Politics of the Commons]. Mandelbaum Verlag.

Fraser N (2014) The significance of Rosa Luxemburg for contemporary social theory. Presented to *The Accumulation of Capital* [Workshop] at the Rosa Luxemburg Stiftung. Available at: https://www.youtube.com/watch?v=zk2VJAW_jHw (accessed 22 November 2023).

Fraser N and Jaeggi R (2018) *Capitalism: A Conversation in Critical Theory.* Polity.

Fuchs C (2014) *Digital Labour and Karl Marx.* Routledge.

Fuchs C and Sevignani S (2013) What is digital labour? what is digital work? what's their difference? and why do these questions matter for understanding social media? *TripleC* 11(2): 237–293. DOI: 10.31269/triplec.v11i2.461

Harvey D (2003) *The New Imperialism*. Oxford University Press.

Helmond A (2015) The platformization of the Web: making web data platform ready. *Social Media + Society* 1(2). DOI: 10.1177/2056305115603080

Huws U (2003) *The Making of a Cybertariat: Virtual Work in a Real World*. Monthly Review Press.

Jarrett K (2016) *Feminism, Labour and Digital Media: The Digital Housewife.* Routledge, Taylor & Francis.

Jarrett K (2019) Through the reproductive lens: labour and struggle at the intersection of culture and economy. In: Chandler D and Fuchs C (eds) *Digital Objects, Digital Subjects: Interdisciplinary Perspectives on Capitalism, Labour and Politics in the Age of Big Data.* University of Westminster Press, pp. 103–116.

Lorusso S (2020) The user condition: computer agency and behavior. Available at: https://theusercondition.computer/ (accessed 22 November 2023).

Lovink G (2019) *Sad by Design: On Platform Nihilism*. Pluto Press.

Luxemburg R (1951) *The Accumulation of Capital (1913).* Kegan Paul.

Marx K (1976) *Capital: A Critique of Political Economy* (1887). Penguin.

Noble DF (1983) Present tense technology - Part One. *Democracy* 3(1): 8–24.

Pfannebecker M and Smith JA (2020) *Work Want Work: Labour and Desire at the End of Capitalism.* Zed Books.

Ptak L (2014) Wages for Facebook. Available at: http://wagesforfacebook.com/ (accessed 22 November 2023).

Sadowski J (2020) *Too Smart: How Digital Capitalism Is Extracting Data, Controlling Our Lives, and Taking Over the World.* MIT Press.

Schiller D (199) *Digital Capitalism: Networking the Global Market System*. MIT Press.

Srnicek N (2017) *Platform Capitalism.* Polity Press.

Stadler T (2022) Grammatiken der Alterity. Das Protokoll als Labor der Sozialität [Grammars of alterity. Protocol as a laboratory of sociality]. *Zeitschrift Für Medienwissenschaft* 15(1): 30–42. DOI: 10.25969/mediarep/19406

Star SL (2002) Infrastructure and ethnographic practice: working on the fringes. *Scandinavian Journal of Information Systems* 14.

Tarnoff B (2022) *Internet for the People: The Fight for Our Digital Future*. Verso.

Terranova T (2014) Red stack attack! Algorithms, capital and the automation of the common. In: Mackay R and Avenession A (ed) *#Accelerate# the Accelerationist Reader*. Urbanomic Media, pp. 279-297.

Toffler A (1980) *The Third Wave*. Bantam.

Tronti M (1974) *Arbeiter und Kapital* [Worker and Capital]. Verlag Neue Kritik.

Viljoen S (2021) A relational theory of data governance. *Yale Law Journal* 131(2): 370–781. DOI: 10.2139/ssrn.3727562

Winner L (1980) Do artifacts have politics? *Daedalus* 109(1): 121–136.

Zuboff S (2019) *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. Public Affairs.