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Platform Architectures: The Structuration of Platform Companies on the Internet

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Platform Architectures

The Structuration of Platform Companies on the Internet

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Platform Architectures. The Structuration of Platform Companies on the Internet

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Abstract

Today's internet is shaped largely by privately operated platforms of various kinds. This paper asks how the various commercially operated communication, market, consumption and service platforms can be grasped as a distinct organizational form of enterprise. To this end, we make a basic distinction between (1) the platform-operating companies as organizing and structuring cores whose goal is to run a profitable business, and (2) the platforms belonging to these companies as more or less extensive, rule-based and strongly technically mediated social action spaces. While platform companies are essentially organizations in an almost archetypical sense, the internet platforms they operate constitute socio-technically structured social, market, consumption or service spaces in which social actors interact on the basis of detailed and technically framed rules, albeit, at the same time, in a varied and idiosyncratic manner. The thesis of this paper is that the coordination, control and exploitation mechanisms characteristic of the platform architectures are characterized by a strong hierarchical orientation in which elements of co-optation and the orchestrated participation of users are embedded. In this hybrid constellation, the platform companies have a high degree of structure-giving, rule-setting and controlling power—in addition to exclusive access to the raw data material generated there. While this power may manifest, at times, as rigid control, direct coercion or enforceable accountability, for the majority of rule-obeying users it unfolds nearly imperceptibly and largely silently beneath the surface of a (supposed) openness that likewise characterizes the platforms as technically mediated spaces for social and economic exchange.

Zusammenfassung

Das heutige Internet wird durch privatwirtschaftlich betriebene Plattformen der unterschiedlichsten Art geprägt. Dieser Aufsatz fragt danach, wie sich diese verschiedenartigen kommerziellen Kommunikations-, Markt-, Konsum- und Serviceplattformen als distinkte Unternehmensform fassen lassen. Dazu wird eine basale Unterscheidung zwischen (1) den plattformbetreibenden Unternehmen als organisierenden und strukturierenden Kernen und (2) den ihnen gehörenden Plattformen als mehr oder minder ausgreifenden sozialen Handlungsräumen vorgenommen. Während sich Plattformunternehmen als Organisationen in einem geradezu klassischen Sinne darstellen lassen, konstituieren die von ihnen betriebenen Internetplattformen soziotechnisch strukturierte Sozial-, Markt-, Konsum- oder Serviceräume, in denen soziale Akteure zwar auf der Grundlage detailliert ausgestalteter und technisch eingefasster Regeln, aber zugleich variantenreich und eigenwillig interagieren. Die für solche Plattform-Architekturen charakteristischen Koordinations-, Kontroll- und Verwertungsmechanismen zeichnen sich durch eine starke hierarchische Ausrichtung aus, in die Elemente der Kooptation und des orchestrierten Mitwirkens der Nutzer eingelagert sind. Die Plattformunternehmen haben in dieser hybriden Konstellation ein hohes Maß an strukturgebender, regelsetzender und kontrollierender Macht – und verfügen überdies über den exklusiven Zugriff auf das dort produzierte Rohmaterial an Daten. Diese Macht äußert sich in vielen Fällen, aber längst nicht immer als rigide Kontrolle, als direktiver Zwang oder einklagbare Rechenschaftspflicht, sondern entfaltet sich für die große Zahl regel-konformer Nutzer weitgehend geräuschlos unter der Oberfläche einer (vermeintlichen) Offenheit, die die Plattformen als Markt- und Sozialräume auch auszeichnet.

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1 Introduction

Today's internet is shaped to a large extent by privately operated platforms of various kinds, the most important being the widely networked socio-technical ecosystems of the leading internet corporations that organize larger social contexts on the web, supplemented by a wide number of specialized platforms of smaller internet companies offering more specific commercial services.

This paper asks how these digital communication, market, consumption and service platforms can be understood as a distinct form of enterprise and explores the depth and scope of the organizational transformation triggered by their emergence. Answering these questions requires an analytical distinction between internet-based platforms and the companies operating them, elaborating the specific coordination and regulatory mechanisms between these two constitutive levels, and placing online-centric platform companies as a novel type of enterprise in a larger socio-economic context.

We begin with a brief historicization showing that capitalist economies have long been characterized by a successive renewal and pluralization of corporate forms (section 2), regularly accompanied by debates about the quality and scope of (inter)organizational change and the associated socio-economic effects. Against this background, we classify the current discourses around platform companies and the emergence of a platform economy accordingly (section 3). We then elaborate on the fundamental structuring of internet-based platform companies and define their architecture as a hybrid constellation of organizing companies as well as more or less open and broadly designed social action spaces: While the platform companies are organizations in an almost classical sense, the platforms they operate constitute socio-technically structured social, market, consumption or service spaces in which social actors interact based on detailed and technically framed rules, albeit in a varied and idiosyncratic manner (section 4). Finally, we discuss the socio-economic reach and scope of this novel type of enterprise, which we consider to be a substantial complement rather than an erosion or even replacement of already existing forms of economic organization (section 5).

2 Historical contextualization: Plurality of corporate forms

From the very beginning, capitalism has been an extraordinarily transformative social formation, characterized by permanent change and sometimes radical upheavals in its socio-economic and technological foundations as well as—concomitantly—by substantial changes in the form and organizational structuring of its central economic units. These organizational changes encompass the emergence of market-dominating large-scale enterprises since the second half of the nineteenth century (Marx 1890 [1962]: 650–657; Hannah 1983: 8–26) as much as a successive shift, characterizing large parts

of the twentieth century, from initially primarily vertically integrated and hierarchically structured enterprises to multidivisional and more decentrally structured corporations, some of which developed into conglomerates that were disjointedly diversified (Chandler 1962).

Since the 1980s, triggered by liberalization policies, the emergence of fundamentally new technologies such as digital information and communication technologies or biotechnology, and the emergence of new technology-intensive economic sectors such as the computer, semiconductor or software industries (DiMaggio 2001a, 2001b), further fundamental differentiations of company types and changes in their organizational forms have evolved. These include:

- the unbundling of economically inefficient conglomerates and the abandonment of sprawling diversification strategies in favor of the opposite trend of many corporations concentrating on a much narrower portfolio of core businesses (Davis, Diekmann and Tinsley 1994);
- the emergence and establishment of start-up firms as a new type of company, which then advanced to become a major driver of fundamental technological innovations, especially in new high-tech sectors (Mowery and Nelson 1999), while also forming the starting point for today's technology corporations (Dolata 2018);
- a radical outsourcing, contract manufacturing and franchising, through which companies increasingly focused on coordination functions became hubs and organizing centers of complex webs of relationships with other firms, feeding the notion of firms as a "nexus of contracts" (Jensen and Meckling 1976; Eisenberg 1999); and
- a continuing trend toward the opening up of corporate boundaries in favor of systematically operated cooperative relationships, such as between corporations, suppliers, technology firms and research institutions, that has been studied empirically as production or innovation networks and reflected theoretically as a novel mode of coordination between different actors (Freeman 1991; Nohria and Eccles 1992; Sydow 1992; Windeler 2001).

Fundamental changes in the forms and expansions of corporate types are, thus, neither new nor unusual in the history of capitalism. Whereas the economic landscape was dominated not only by countless small- and medium-sized enterprises but, above all, by diversified and divisional large corporations until the 1970s, it has been since the 1980s characterized by a significant differentiation and plurality of coexisting forms and networks of enterprises. This plurality of corporate forms, which resists being condensed into any one ideal-typical form (Powell 2001), is represented to varying degrees against the background of different variants of the economy, liberalization and innovation systems in the capitalist core countries (Mowery and Nelson 1999). In short, gradual transformation processes extending over longer periods of time and a differentiation of corporate forms have since characterized the economies of the capitalist centers that are the subject of the following discussion.

3 Debates: Digital platforms and the platform economy

The emergence of new forms of corporations and types of interorganizational networking is regularly accompanied by public and academic debates that are as polyphonic as they are disparate and that are generally discussed at two essential levels. One is the quality and scope of the (inter)organizational changes diagnosed in each case, and the second is, more broadly, the socio-economic effects associated with these changes. In the 1990s and 2000s, such organizational changes were conceptualized, for example, as boundaryless, horizontal, temporary, modular or virtual—"with emphasis on fluidity and cooperative networking both inside the organization and between organizations" (Schreyögg and Sydow 2010: 1252; also DiMaggio 2001b; Toffler 1985)—and reflected as the emergence of a small-scale new economy as well as the advent of a decentralized capitalism (Zerdick et al. 2000; critically, Porter 2001; Dolata 2005). The latter, however, quickly proved to be untenable in view of the rapid concentration processes in various high-tech sectors and the internet economy.

The discussions about the peculiarities and scope of internet-based platform companies, which have intensified since the mid-2010s, very much resemble this pattern and are characterized by rather bold concepts based on very limited empirical evidence. Rahman and Thelen (2019: 198), for example, see platform firms—following classic industrial firms and their transformation into so-called network-of-contracts firms—as nothing less than the emergence of a "new vanguard firm: the 21st century ideal type of the *platform* firm." Davis (2016: 513) describes the firm of the future as an "enterprise as web page, in which the 'firm' is a set of calls on resources that are then assembled into a performance." So far, such far-reaching diagnoses of transformations have developed primarily from individual cases such as Uber, which are then implicitly or explicitly elevated to the status of generalizable cases, and referred to as *uberization*, for instance (Davis and Sinha 2021; Faraj and Pachidi 2021).

This also applies to diagnoses of the accompanying socio-economic effects, for example, on markets and market relations, or the allocation of labor or on processes of profit generation and realization, which were then readily given labels such as "platform economy" (Kenney and Zysman 2016) or "platform capitalism" (Srnicek 2017). Kenney and Zysman (2016: 62), for example, were quick to place what they term the "platform economy" within a very broad historical framework, emphasizing that, "if the industrial revolution was organized around the factory, today's changes are organized around these digital platforms, loosely defined." Building on this, Kirchner (2021: 20) sees the emergence of digital platforms as leading to the erosion of the organizational society:

> "To the extent that platforms penetrate social subsectors, digital platforms become a dominant structural principle for labor, the economy and society as a whole. When seen in terms of time diagnostics, the classic organizational society of large-scale organizations is entering a new mode and thus gradually transforming into a 'platform society'." (our translation)

These are far-reaching assessments that we do not confirm in this paper. In contrast, we are interested in how internet-based platforms are structured as a specific form of enterprise, how they fit into the plurality of forms of enterprises found empirically, and how profound the organizational change triggered by their emergence actually is.

Any undertaking to address these issues must systematically take into account that the internet-based platforms and the companies operating them differ significantly from one another. This not only concerns basic economic indicators such as revenue, profit or employment but also their economic or social reach and significance (Dolata 2022; Van Dijck, Poell and Wahl 2018: 12–22). The leading internet corporations Alphabet (Google), Amazon, Meta (Facebook) and Apple, whose platforms shape the infrastructural and institutional basis of today's internet, have now greatly diversified their business. They have built up a broad spectrum of business areas and services which they have expanded into networked socio-technical ecosystems that extend well beyond their traditional fields of activity and far beyond their immediate corporate contexts. In contrast, countless smaller internet companies—such as Uber, Airbnb, Spotify, Netflix, Twitter or Zalando—offer more specific services on their platforms. As a rule, the latter are singular and specialized consumption or service offerings that are either directly market- and consumption-oriented, such as travel bookings, room rentals, driving services, video or music-on-demand services and shopping portals, or communication-oriented, such as Twitter, TikTok or Snapchat (*table 1*).

Table 1. Core economic data of selected platform companies 2020

	Revenue (in billion U.S. dollars)	**Net income** (in Billion U.S. dollars)	**Employees**	**Ranking on Fortune Global 500***	**Ranking on Forbes Global 2000****	**Core business** (in percent of revenue)
Amazon	386.06	21.33	1,289,000	3	10	E-commerce (87%), cloud (12%)
Apple	274.52	57.41	147,000	6	6	Hardware (80%), services (20%)
Alphabet (Google)	182.53	40.27	135,301	21	13	Advertising (80%), cloud (7%)
Microsoft	143.00	44.30	166,475	33	15	Software (63%), cloud (34%)
Meta (Facebook)	85.97	29.15	60,654	86	33	Advertising (98%)
Netflix	25.00	2.76	12,135	484	219	Subscriptions (video)
Uber	11.14	- 6.77	26,900	–	722	Mobility services
Zalando	7.98	0.23	~ 15,000	–	1348	E-commerce
Spotify	7.88	- 0.58	6,554	–	1171	Subscriptions (audio); advertising
Twitter	3.72	1.13	4,600	–	1583	Advertising
Airbnb	3.38	- 4.58	5,597	–	1529	Accommodation service
Snap	2.51	- 0.95	2,734	–	1544	Advertising
Delivery Hero	2.47	- 1.40	29,436	–	–	Delivery service / commissions
Just Eat Takeaway	2.05	0.15	~ 8,000	–	–	Delivery service / commissions

* ranked based on the companies' annual revenue.

** ranked based on the four equally weighted measures of revenues, assets, market capitalization and net income.

Sources: annual reports, Fortune Global 500, Forbes Global 2000, press reports

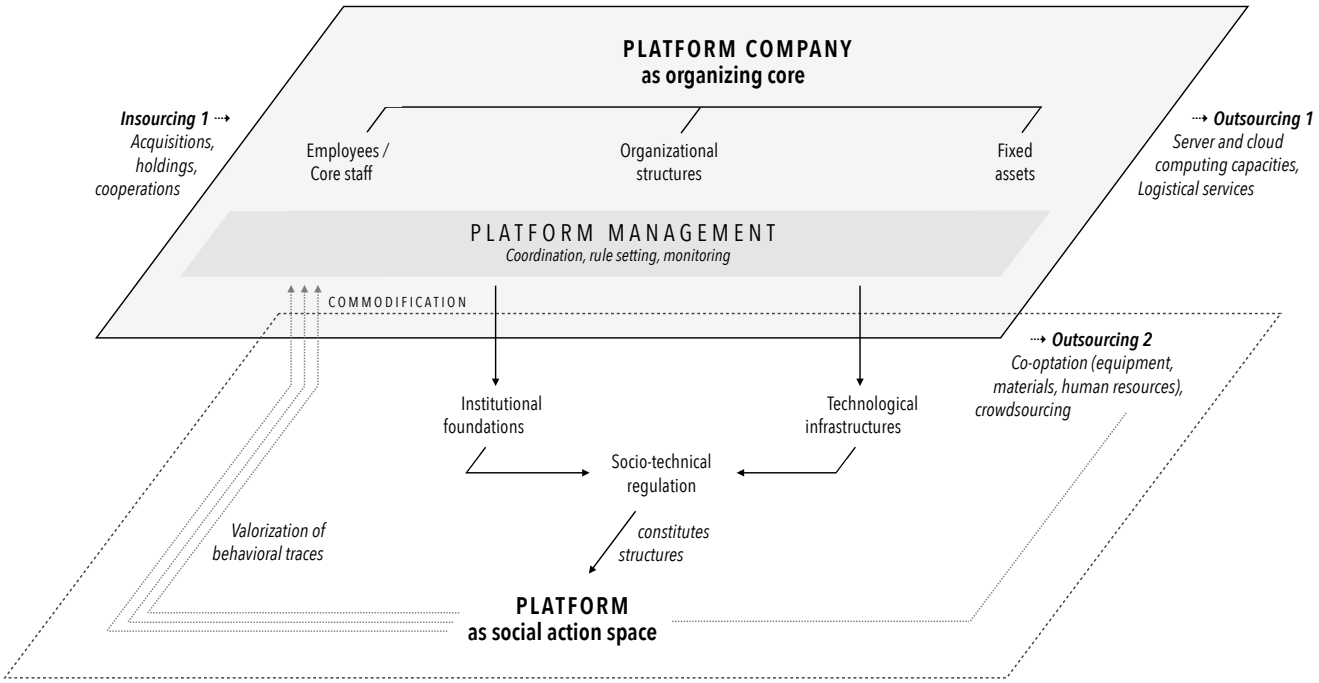
4 Platform architectures: Structuring and coordination

In order to capture the complex structure of this type of enterprise, we initially draw on a very basal and formal conceptualization of platforms developed by Baldwin and Woodard (2009) in the late 2000s. They described the basic architecture of platforms as the interplay of a stable, tightly coupled and rule-setting core and a variable, flexible and volatile periphery, held together by rule-based interfaces:

> "The fundamental architecture behind all platforms is essentially the same: the system is partitioned into a set of 'core' components with low variety and a complementary set of 'peripheral' components with high variety. The low-variety components constitute the platform. They are the long-lived elements of the system and thus implicitly or explicitly establish the system's interfaces, the rules governing interactions among different parts." (Baldwin and Woodard 2009: 19; see also: Ametowobla 2020: 9–12)

The advantage of this formal view of platforms is that it can also be used to structure the analysis of the architectures and coordination mechanisms of digital platforms and their commercial operators. The disadvantage is that this formal view alone does not say anything about the distinctive substance and the specificity of internet-based platforms. This very general definition that deliberately avoids any substantive specification could serve just as well to depict other economic entities as platforms, such as industrial research and production networks with coordinating core companies and numerous cooperation partners, or nexus-of-contracts firms that have been, by and large, streamlined to deliver coordination functions.

Figure 1. Platform company and platform as a hybrid constellation



Source: own reflections

As a starting point for our argumentation, this definition is nevertheless instructive—especially as it can be used to differentiate the often fuzzy talk of "the platforms." It allows making an analytical distinction between (1) the platform-operating companies as organizing and structuring cores whose goal is to operate a profitable business (core components with low variety) and (2) the platforms belonging to them as more or less extensive, strongly technically mediated and volatile market and social action spaces that provide an institutional framework for the activities of a wide variety of social actors on today's internet and in some cases extend far beyond the immediate corporate contexts of their providers (peripheral components with high variety) (*figure 1*).

4.1 Platform companies: Organizing cores

The companies that operate internet platforms form the organizing core of these hybrid and sometimes very extensive socio-technical entities. They have in common that they exhibit all the typical characteristics of formal organizations—and that they could not be, for example, referencing the work of Ahrne and Brunsson (2019, 2011), described as *partial organization(s)* that lack essential organizational features.

Platform companies are not identical with their platforms but represent, rather, the organized places of strategic decision-making and the management of the platforms they own. They have clearly defined internal organizational, management, decision-making and control structures that are more or less differentiated depending on their size and more or less hierarchical depending on the company. They have permanent core workforces in contractually formalized employment relationships, without whose services neither the companies themselves nor the platforms they operate would be able to function. Their work spectrum ranges from classic activities in the areas of finance, sales, marketing and distribution to highly qualified activities in strategic management and operational control, in research, programming, software and design development, and in the areas of maintenance, renewal and improvement of IT infrastructures. In the case of retail companies such as Amazon or Zalando, the platform companies also have employees in the numerous company-owned warehouses and logistics centers.

One specific feature of platform companies that is regularly highlighted in the literature is the assumption that they have outsourced essential means of production (fixed assets) and constitutive work services from their corporate contexts, at times in radical ways, and that they pursue an asset-light business model. "Platforms leverage physical assets, R&D, workforce, salesforce, market research, and the creative energies of customers not by making or buying but by the strategy of co-opting" (Stark and Pais 2020: 53; see also: Grabher 2020; Kirchner, Schüßler and Schor 2021). However, this characterization does not apply at all to the leading internet corporations Alphabet, Amazon, Meta (Facebook) and Apple—"the world's most valuable public companies;" "all

of them are platform businesses" (Stark and Pais 2020: 48). Moreover, it applies to smaller internet-based platform companies only to varying degrees.

The leading internet groups—and thus by far the most important platform companies worldwide—all operate in a decidedly asset-heavy manner. They not only have extensive corporate headquarters and large in-house research and development (R&D) centers but also maintain their own data centers, server farms and network infrastructures, as well as—in Amazon's case—countless warehouses and logistics centers where the majority of their employees work and in whose expansion they invest heavily (Dolata 2018). Alphabet's 2020 annual report, quoted here as an example, reads like this:

> "We continue to make significant R&D investments in areas of strategic focus such as advertising, cloud, machine learning, and search, as well as in new products and services. In addition, we expect to continue to invest in land and buildings for data centers and offices, and information technology assets, which includes servers and network equipment, to support the long-term growth of our business." (Alphabet 2021: 25)

In addition, all leading internet corporations are engaged in a massive insourcing of technologies, patents and know-how, research, production, logistics and platform capacities via their proactive engagement in development alliances, open-source communities (Schrape 2019) and, above all, sprawling acquisition strategies (Nadler and Cicilline 2020: 406–450). More pointedly, the leading internet groups own all assets essential to their business—including all relevant intangible assets such as patents, copyrights and trademark rights. Moreover, their business is primarily based on the work of their internal employees—and not on contributions from co-opted workers, who of course also exist. All this does not substantially distinguish them from classic industrial or commercial groups.

For smaller and more specifically tailored platform companies, the picture is somewhat, but not entirely, different. These have indeed outsourced labor and means of production from their corporate contexts, in some cases on a large scale. In terms of labor, this applies to the sometimes high number of often formally self-employed and volatile workers who work as drivers for Uber or as interchangeable couriers for delivery services (Schrape 2021a: 107–111). In addition, it applies to real estate (Airbnb), vehicles (Uber) or the server and cloud computing infrastructures on which these companies' platform businesses are based. Airbnb's booking services and Netflix's streaming services, for example, run entirely on Amazon Web Services (AWS) (https://aws.amazon.com/solutions/case-studies).

The latter involves a significant volume of outsourcing of relevant production resources. However, the quality of such material outsourcing processes varies. Simple means of production, such as vehicles or real estate, can easily be outsourced from the corporate context. This has long been typical for larger cab companies or tour operators and are also central components of the business models of Uber, Airbnb or Booking.com. These are peripheral components with high variety: The platform companies

can co-opt these outsourced means of production just as decentrally as flexibly via their platforms. This does not, however, apply to more complex means of production, especially not to the outsourced server and cloud computing capacities that form the actual material basis of the platform businesses of these companies. These are core components with low variety, which cannot be co-opted on a situational and flexible basis but are instead rented on the basis of longer-term contracts from large providers such as AWS, Google Cloud Platform (GCP) or Microsoft Azure while belonging as central technical infrastructures to the operational core of these platform companies.

The operating core also includes strategically relevant areas such as own R&D activities, which are also of central importance for the research-intensive smaller platform companies. In 2020, for example, Twitter invested about 27%, Uber just under 20% and Netflix and Zalando a good 8% of their revenue in research and development (R&D) (Twitter 2021: 41; Uber 2021: 59; Netflix 2021: 48; Zalando 2021: 78). The R&D departments of these companies work primarily on technical improvements to their service offerings and the further development of the software used on their platforms (Ziegler 2021: 20f.). Retail platforms such as Zalando also have their own warehouses and logistics centers. In addition, smaller platform companies such as Uber, Airbnb or Spotify pursue strategies of insourcing through acquisitions. The streaming service Spotify, for example, acquired, among others, the platform The Echo Nest in 2014, whose expertise has been instrumental in professionalizing its curated playlists and recommendations, and has also purchased several start-up companies since 2018, such as Anchor FM, Cimlet Media and Cutler Media, with the aim of expanding audio podcasts as a new business segment alongside music streaming (Dolata 2021). In short, even smaller platform companies cannot do without their own production resources, which they either own or rent.

A similarly differentiated picture emerges for the outsourcing of paid labor. For crowdworking platforms, mobility providers, accommodation agencies or delivery services, on which the existing social science literature focuses, such outsourcing practices are a constitutive and central component of their business models. In principle, the outsourcing of labor is anything but new and can be interpreted as a direct continuation, intensification and, indeed, radicalization of the deregulation and flexibilization of work and labor relations observed in recent decades (Huws 2016, 2014: 17–26; Voß and Pongratz 1998). This radicalization takes place on the internet platforms by means of algorithmic rule-setting, coordination and monitoring, focusing on a reservoir of co-optable workers that can be utilized by companies in extremely variable and seamlessly controllable ways (Frenken and Fünfschilling 2020; Schreyer and Schrape 2021). However, such an extreme outsourcing of paid labor cannot be generalized and considered a constitutive feature of all platform companies. The core activities of media streaming platforms such as Netflix or Spotify, of communication platforms such as Twitter or of retail platforms such as Zalando are not supported to a comparable extent by external labor that can be situationally varied.

Against this background, the claim of an emergence and spread of "webpage enterprises" which almost exclusively obtain their material resources and labor from the outside, as postulated by Davis (2016; Davis and DeWitt 2021: 1694f.) using the Uber example, is not tenable. This postulate does not apply at all to the leading internet corporations; and even smaller, more specifically oriented platform companies cannot manage without their own core workforces and internal labor services that are crucial to support their business, or without their own or long-term leased assets that cannot be co-opted from their platforms on a situational basis.

The organizational foundations outlined here form the basis on which the actual core activities of the platform companies can unfold: the (further) development, structuring, regulation and control of the platforms they operate. In the platform companies, the fundamental social structures and rules are developed and inscribed in the technical infrastructures that provide the general framework for the activities and interaction possibilities of their platforms' users—including the possibility of sanctions and exclusion in the event of rule violations. The platform companies thus do not merely function as coordinating intermediaries offering neutral (technical) mediation services but, rather, as rule-setting and rule-enforcing actors (Dolata 2022). In addition, they also collect all interaction and transaction data that initially accrues as raw material through the seamless observation of user behavior on the platforms, which belongs to their possession and is only brought into a commodifiable form through its further processing in the companies (Zuboff 2019).

Coordination and rule-setting, monitoring and valorization of data, coupled with the ability of the platform companies to quickly, substantially and largely uncontrollably adapt the social rules they establish and their technical implementation to changing environmental conditions and business perspectives (Gillespie 2016): this is the very heart of platform management and work *in* platform companies—and is constitutive of the substantial and systematic power imbalance that opens up between platform companies and all the actors who interact on their platforms.

> "To illustrate, platforms can unilaterally change competitive or labor conditions on the platform entirely at their own discretion and with no warning. As the panopticon they can monitor [...] activity and shape that activity in ways that are most advantageous to the platform." (Kenney, Zysman and Bearson 2020: 235)

The distinctive quality of internet-based platform companies that distinguishes them from other business organizations offering products or services on external markets thus lies less in their basic organizational structure than in the fact that, as organizing and rule-setting cores, they enable, structure, observe and commercially exploit market interactions and social relationships on the internet, some of which extend far beyond their immediate organizational context.

4.2 Platforms: Social action spaces

While platform companies can be understood as organizations in an almost archetypal sense, this does not apply to the digital platforms they operate. The latter are not "evolving organizations or meta-organizations" (Gawer 2014: 1240), seeing that they lack essential organizational characteristics such as intentionality, goal orientation and strategic capacity to act (Dolata and Schrape 2018: 11f.). They are, rather, organized and more or less expansive social action spaces with a strong technical foundation and institutional basis.

All internet platforms can be understood as hardware- and software-based, programmable and algorithmically structuring technological infrastructures (Kitchin 2021; Helmond 2015) through which information is exchanged, communication is organized, work and markets are coordinated, a broad spectrum of services is offered or digital and material products are distributed. At the same time, all internet platforms are characterized by an action-orienting institutional foundation that is shaped by social rules and norms which the platform-operating companies formulate and define (e.g., as terms and conditions, community standards) as well as by their comprehensive inscription in the technical foundations of the platforms, for example in the form of default settings, technical features and, most importantly, in the form of algorithmic structuring, rating, ranking and monitoring systems (Gillespie 2014; Gillespie et al. 2020; Saadatmand, Lindgren and Schultze 2019; Yeung 2018).

On the one hand, the platforms are an elementary component of the companies to which they belong and without which they could not operate their business. At the same time, however, they extend, in part, clearly beyond the platform companies organizing them. As distinct social action spaces, they form a second level within this hybrid constellation that is more or less closely coupled to the platform companies as organizing cores (*figure 1*). On this second level, social actors of the most diverse provenance act and interrelate with one another in specific figurations and on the basis of the respective platform rules, be it openly or closely guided. And in this way, they also contribute to the substantiation and further development of the platform.

Below this overarching characterization of platforms as social action spaces, it is again necessary to differentiate. The various privately operated platforms on the internet differ significantly from one another in terms of their design and orientation as well as their size and reach (*table 2*).

Among all the platforms discussed here, the big social media and social networking platforms have the broadest reach. In the case of Facebook, Instagram or YouTube, these platforms are an integral part of the networked socio-technical ecosystems of the leading internet corporations. These platforms are typically characterized by an extremely low-threshold access and plural figurations of actors. Social media and social networking platforms are open to the most diverse commercial and non-commercial

expressions and activities of virtually all social actors that society has to offer (Van Dijck, Poell and Wahl 2018; Habermas 2021; Schrape 2021b). Therefore, they can be described as social spaces in a very inclusive sense, which organize and structure basic patterns of social exchange on today's internet. In other words, with their technically mediated sets of rules, structuring, selection, monitoring and sanctioning mechanisms, these platforms have taken over essential social order and regulation functions in the internet realm. This is an entirely new phenomenon: with their digital platforms, individual companies constitute nothing less than the structural and institutional foundations of a private-sector sociality on the internet, and in doing so, they are in some cases assuming quasi-sovereign tasks of rule-setting and enforcement—on an international scale (Dolata 2022; Schrape 2021a).

Table 2. Platforms as social action spaces—a typology

	Social spaces	**Market spaces**	**Consumption spaces**	**Service spaces**
Examples	*Facebook, Instagram, YouTube, Twitter*	*Amazon Marketplace, App Stores; Airbnb, Upwork*	*Amazon, Zalando; Netflix, Spotify, Apple Music, Amazon Video*	*Uber, Lyft; Just Eat Takeaway, Delivery Hero*
Targeted actors	Full spectrum of social actors	Customers; co-opted providers	Customers; cooperating providers	Customers
Actor figuration	plural	triangular	bilateral	bilateral
Access	low-threshold; specific rules for users and commercial providers	low-threshold on the customer side; platform operators define access or exclusion criteria for commercial providers	low-threshold or dependent on subscriptions on the customer side; commissioning or licensing of external offers	open on the customer side; low-threshold access for commercial providers
Reach	Constitution of social order on the internet	Organization and regulation of proprietary markets	Organizing and structuring of consumption offers	Organization and structuring of services
Economic basis	personalized advertising	Commissions; sale of own products	retail sales; subscription fees; advertising	Fees; commissions
	Commodification of behavioral traces			

Source: own reflections

The dominant exploitation logic pursued by platform companies—such as Meta (with Facebook, Instagram, WhatsApp), Alphabet (with YouTube), Twitter or ByteDance (TikTok)—with their social media and social networking platforms is largely an indirect one. The evaluation and processing of the data traces left behind by their users as raw material serves these platform operators primarily to generate advertising revenue.

In contrast, the majority of the countless other privately operated internet platforms are organized directly and decidedly as commercial offerings. The spheres of social exchange and activity that these platforms offer are much more focused and take on the economically more immediate form of market, consumption and service spaces for products, content, services or work.

Some of these platform companies operate market spaces in the form of company-owned marketplaces where third-party providers can offer their goods or services independently. Prominent examples of such market spaces are Amazon Marketplace, app stores for IT consumer devices, travel and booking platforms such as Airbnb and Booking.com or crowdwork platforms such as Upwork (Barwise and Watkins 2018; Khan 2018; Howcroft and Bergvall-Kareborn 2019; Dolata and Schrape 2014). The market spaces for commercially active influencers embedded in the major social media platforms are also part of this. The basal actor figurations in these marketplaces are triangular. The operators of the company-owned marketplaces take on the role of intermediaries who not merely technically enable and moderate independent market actions between third parties—suppliers and buyers—as "matchmakers" (Evans and Schmalensee 2016) but who also define the market rules and competitive conditions as well as the distribution and remuneration structures; develop product information, rating and performance control systems; guarantee secure forms of payment; and decide on the inclusion and exclusion of suppliers (Kirchner and Beyer 2016). Access to these market spaces is open to consumers, who are at the same time actively involved in the rating and control structures of the platforms. The commercial providers who engage in these marketplaces with their offers are co-opted by the market operators and are committed to their guidelines.

Then again, numerous other digital platforms function primarily as competing consumption or service spaces in which the platform operators act not as intermediaries but directly as market players, offering consumers their own, commissioned or licensed products, content or services. Retail platforms such as those of Amazon, Zalando or the Otto Group, streaming platforms for on-demand consumption of audio and video content such as Spotify and Netflix, as well as mobility platforms such as Uber or delivery services such as Gorillas or Delivery Hero fall into this category. In terms of their basic services, the latter are structured similarly to common courier and parcel services and directly control associated logistics and labor resources. In all these cases, direct sales actions and two major groups of actors—providers and customers—dominate the activities on the platforms, supplemented by the involvement of customers beyond the direct act of consumption, especially in the platform-specific rating systems. Accordingly, these platforms are more directly and closely linked to their organizing cores than social media platforms and company-owned market spaces. This applies not only to the respective core business, which is carried out by the platform operators themselves, but also to the organization of paid labor services, which is typical for mobility and delivery services, for example. The workers there, often subject

to precarious and volatile working conditions, do not offer their services to various third parties, as is the case in crowdworking marketplaces, but to the platform company itself, which coordinates, monitors and sanctions their activities along exhaustive performance specifications in an extremely detailed and hierarchical manner (Schor et al. 2020; Griesbach et al. 2019; Wood 2020).

Overall, the systematization presented here shows that the social action spaces spanned by the platform companies take on very different concrete forms and must be viewed in a correspondingly differentiated manner. Spectacular and historically singular are, above all, the far-reaching social media platforms operated by the large internet corporations, which constitute essential foundations of sociality on the internet, as well as the large company-owned marketplaces, which can be characterized as privately regulated and socio-technically constituted market orders on the web.

4.3 Regulation: Coordination, control and exploitation mechanisms

One crucial question remains unanswered up to this point: Are the outlined platform architectures characterized by a specific form of coordination and control of social action that differs from other economic units that also clearly extend beyond the essential corporate context (e.g., corporate networks or nexus-of-contracts firms)? This recalls the search for "the system's interfaces, the rules governing interaction among different parts" (Baldwin and Woodard 2009: 19) cited at the beginning of this text, which concerns the interplay of the two levels of platform architecture spanned (*figure 1*) as well as the possibilities for action of the highly diverse users on the platforms themselves. While industrial or innovation networks are characterized by contractually secured cooperative relationships and nexus-of-contracts firms by contract-based supply or distribution structures between various independent organizations, whose rules are agreed upon by the actors involved in negotiations, the platform architectures outlined here are more expansive, the actors involved more heterogeneous, and the socio-technical patterns of regulation—i.e., the platform-specific coordination, control and exploitation mechanisms—significantly more complex. It is not only economic processes in the narrower sense that need to be organized and coordinated here but also social relationships that are in part very multifaceted and broadly diversified.

The basis of the interplay between the two levels of the platform architecture—this is often underestimated or overlooked—is formed by non-negotiable contractual relationships between the platform companies and the users of their platforms, which are set unilaterally by the companies in the form of detailed terms and conditions and have to be accepted by the participants. Only by agreeing to these terms and conditions do the latter gain access to the platforms and at the same time submit to the general rules that apply there. This applies to individual users as well as professional influencers, software developers in the app stores or merchants on proprietary marketplaces. At the same time, the terms and conditions with their far-reaching transfers of rights to the

user-generated content and data left by all platform participants form the essential basis for the business of every platform company. It is only on this contractually secured basis that the seamless observation, systematic data processing and economic valorization of the behavioral traces of all participants become possible. Terms and conditions as contractual relationships thus form the basic link between the two levels of the platform architecture: On the one hand, they regulate the conditions of access and structure the possibilities of action for all participants on the platforms. And on the other hand, they form the legal basis for the economic exploitation activities of the platform companies.

This strong and asymmetrical contractual basis, which is characteristic of all commercial internet platforms, is supplemented by specifying rules of action that enable and structure the activities of the platform participants. These include: the aforementioned community standards characteristic of social media platforms; affiliate programs on the basis of which professional vloggers operate on YouTube or influencers on Instagram, TikTok or Twitch; developer guidelines in app stores; market and compensation rules in proprietary marketplaces; and tightly meshed performance (control) systems in mobility or delivery service providers.

These platform-specific rules of action exhibit four typical features. First, these rules are not negotiated between different actors, as is the case in production or innovation networks between organizations, but rather to be set by the platform companies in the form of hierarchical instructions. The fact that they are disputed and—as shown, among others, by the periodically flaring disputes about working conditions on delivery or mobility service platforms—at times contested (Schüßler, Kirchner and Schor 2021; Schreyer and Schrape 2021) does little to change the fundamental pattern of a top-down specification of the frameworks of action that apply on the platforms. Second, these initially genuinely social rules are translated as comprehensively as possible by the platform companies into technical or algorithmic instructions and structuring, thereby taking on the form of socio-technical institutionalization that can hardly be overridden in everyday usage practice, and only with a great deal of effort.

Third, the platform companies have considerable scope for curation, in other words, far-reaching possibilities for permanent readjustment of both the socio-technical structuring of their platforms and the rules of the game that apply there. Corresponding readjustments are regularly made by the platform operators, for example, in the terms and conditions and community standards, in search algorithms or in the rating and ranking systems, whereby both the idea of social reality presented on the platforms and the framework conditions for the actions of private and professional actors become reconfigured in rapid succession and, often, quite significantly. Frenken and Fünfschilling have referred to these basic patterns of dynamic structuring and institutionalization, which are typical for internet platforms, as “re-coding capacity”:

> "Platforms can quickly re-code their software and/or alter their terms and conditions, creating a new artifact with slightly different workings that would necessitate a new court case, and so forth. The re-coding capacity provides platforms the ability to continuously adapt the course of institutionalization in largely autonomous manners." (Frenken and Fünfschilling 2020: 107)

As a fourth feature, the platform companies not only set the rules that are to apply on their platforms but also monitor compliance with them and—more broadly— observe the behavior of all platform participants almost seamlessly. This is done via a two-level system characterized by centrally designed and implemented monitoring and control mechanisms and by the systematic active involvement of users and providers in the platforms' monitoring and evaluation architectures. In other words, internet platforms are characterized by both—by forms of a centralized "algorithmic bureaucracy" (Kirchner and Schüßler 2019: 144) and by procedures of a decentrally designed "non-bureaucratic control" (Stark and Pais 2020: 55) embedded within them.

The first level includes, for example, monitoring compliance with community standards, alongside sanctions such as deleting content or accounts, monitoring providers on platform markets, or recording and monitoring the performance of employees of mobility or delivery services. These are forms of centralized hierarchical observation and control that converge in the platform companies and are implemented by them. In addition, all platforms are characterized by a second level of decentralized monitoring and control systems through which evaluation and monitoring activities are delegated to the platform participants, understood to include both users and providers. To this end, the platform companies primarily provide rating systems of various kinds through which all participants can monitor, rate, rank or classify all other participants—including the reporting of questionable content or accounts. The platform participants are thus integrated into the monitoring and control systems of the platforms as decentralized co-controllers—and are in turn subject to supervision by the platform companies, which not only provide the corresponding ranking and rating systems but also evaluate the data traces of the co-controllers stored there and feed them into their exploitation contexts.

Contractual relationships as the legal basis, rules as a framework for action, observation and control systems for monitoring compliance with these rules and for monitoring behavior: pre-structured in this way, the platforms themselves become the central resource reservoir for the companies, on which a specific economic exploitation mechanism is based. At first glance, the commercial starting points of the platform-operating companies have remained quite clear and unspectacular over the years. They focus on advertising, trading, subscription models, brokerage fees and the preparation and sale of data resources in a way that hardly differs from the early 2000s, a time when this was still being discussed under the label of "e-commerce" (Zerdick et al. 2000: 136–176; Riehm et al. 2003). This is true not only for smaller platform companies such as Airbnb, Uber, Spotify, Netflix or Twitter but also for the leading internet corporations (Table 1).

What is new and unprecedented, however, is the central foundation on which the business of all platform companies considered here is based: the technical possibility and

economical implementation of a ubiquitous commodification of individual behavioral traces, which Zuboff (2019) has described as a core element of "surveillance capitalism" and which Voß (2020: 106) subsequently concretized as a novel form of capitalist colonization (*Landnahme*), arguing that the "expansion of profit-based economic modes through access to areas that are not (or not completely) capitalist in nature" (our translation) has now also captured all facets of everyday life (see also Crain 2018).

This commodification of user behavior takes place in a close interplay between the two levels of the platform architecture that is pre-structured by the platform operators. In a first step, with all their activities on the platforms (e.g., as user-generated content, in the form of communication flows, comments, ratings, likes or rankings), the users leave behind their everyday life traces as exploitable data material. However, they mostly do so not, as is often emphasized, in the form of unpaid labor or as "working pre-producers" (Voß 2020: 106 [our translation]; see also Hardy 2014: 136–156; Fuchs 2014, 2018: 678) but, more trivially, through the willing disclosure of the most diverse facets of their everyday behavior. In this way, they initially provide no more than indispensable raw material that is passed on to the platform companies for further processing through the assignment of rights of use, yet which, as a mere accumulation of data, does not yet have any value or commodity character.

In a second step, this raw data material is aggregated, refined and processed into a valuable asset by the platform companies themselves, where the actually productive and value-creating work takes place. All the activities and expressions of life of the platform users, which often provide usable data traces unintentionally and in passing, are evaluated, aggregated and made commercially usable in technically demanding and organizationally complex processes. It is only through these processing and refinement activities in the platform companies that the disperse digital behavioral traces become a commodity that has value and becomes economically relevant for the own company—for example, for refining and improving the quality of the platform's own search, matching, recommendation and curation offerings—or for third parties, especially as tradable data sets and as personalized advertising options.

Taken together, the coordination, control and exploitation mechanisms typical of internet-based platform architectures are characterized by a strong hierarchical orientation in which elements of co-optation and orchestrated participation of users are embedded. In this hybrid constellation, the platform companies have a high degree of structure-giving, rule-setting and controlling power—as well as exclusive access to the raw data material produced there. This power manifests itself in many cases—we think only of the position of workers in the mobility and delivery service sector or the closely managed commercial providers on proprietary marketplaces—but by no means always as rigid control, as direct coercion or as enforceable accountability. Instead, for the large number of rule-abiding users, it unfolds barely perceptibly and largely silently beneath the veneer of a (supposed) openness that also characterizes the platforms as market and

social action spaces. The users, consumers and providers are voluntarily on these platforms; they can pursue their interests and business there and can collaborate, communicate or observe and evaluate each other at their own discretion. In doing so, however, they have to abide by rules over which they have virtually no influence; agree to surveillance systems that are as comprehensive as they are opaque, and which they can neither design nor control; and agree to the far-reaching expropriation of their statements and behavioral traces left on the platforms as raw data in exchange for access.

5 Conclusion: Platform companies as a distinct organizational form

Overall, there are several arguments in favor of conceiving of the internet-based platform companies outlined here and the digital platforms they operate as a new corporate form. This applies first of all to their specific structuring: typically, platform companies do not primarily maintain and coordinate network-like cooperative or contractual relationships with other organizations but act as organizing, curating and controlling nuclei of more or less extensive social action spaces on which their business is based. The most expansive in design are the large social media platforms, which are open to the activities of a wide variety of social actors and which constitute nothing less than the foundations of sociality on today's internet, as well as the corporate-owned marketplaces, which are organized and coordinated by the respective platform companies. In all cases, the platform companies do not function as neutral intermediaries or matchmakers that merely establish connectivity but as rule-setting and rule-enforcing entities that curate and observe the diverse activities on their platforms through technical mediation. In doing so, they partly take over functions that were previously reserved for democratically legitimized state regulation.

The platform architectures are characterized by a correspondingly asymmetrical relationship between control and openness or between centrality and decentralization. The essential structures, rules and control mechanisms that characterize all commercial platforms on the web are set centrally and implemented top-down by the platform companies. On this basis, however, participants are at times given considerable decentrally distributed latitude for action and activity, which they can use in a varied and idiosyncratic manner—always, of course, based on the applicable platform rules and seamlessly monitored. This very variety and indeterminacy of user activities, in turn, serves the platform companies as a central resource and prerequisite for their economic business, which is based on the data-based exploitation and valorization of both the individual behavioral and the organizational traces of action that the participants leave behind on the platforms.

Taken together, all this means that internet-based platform companies constitute a new, distinct type of company that characterizes the economic exploitation of the internet.

However, this cannot be understood as an erosion of—or even a replacement for—the forms of economic organization outlined at the outset and be generalized beyond the internet economy. First, it should be emphasized once again that the platform companies themselves are structured as formal organizations in an almost archetypical manner (Arnold, Hasse and Mormann 2021). Second, their macroeconomic significance and spread have so far remained decidedly limited. As Pfeiffer (2022: 139–198) has rightly pointed out, the specific organizational forms that characterize internet-based platforms and the companies that operate them are limited to selected areas of the distribution sphere. Although quite a few internet-based platform corporations are now among the globally most valuable companies in terms of their market capitalization, their economic activities have so far contributed very little to the gross domestic product and employment in the core capitalist countries, including the United States, for which corresponding data are available (Barefoot et al. 2018; International Monetary Fund 2018). Even in the annual Fortune 500 and Forbes Global 2000 rankings of the world's largest companies (Fortune 2021; Forbes 2021), dominated by industrial, commercial and financial groups, internet-based platform companies have not played a significant role to date, except for the leading internet groups (*table 1*). Whether the organizational principles of internet-based platform companies can be transferred to other core sectors such as manufacturing and to what extent they are able to trigger a corresponding organizational transformation of industrial companies has hardly been researched to date.

All this argues for understanding platform companies for what we believe they are: a further step in the pluralization and quite considerable differentiation of the corporate forms that coexist in the varieties of capitalist core countries.

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