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Enclosure 4.0: Seizing Data, Selling Predictions, Scaling Platforms

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Abstract

Advance notice: Rather than a straight narrative, this is a roadmap, roughing out rather divergent pathways for the further exploration of platforms. The essay sets off by reiterating the agentic qualities of machinery for understanding the dynamics of platformization and elucidates the dialectical dynamics of (dis)embedded digital platform labor. Subsequently, the societal implications of the "asset-light" business model of platforms as well as of the framing of platform labor as independent entrepreneurship are explored. After perceiving datafication through the optic of assetization, the essay finally explores the platformization of manufacturing and agriculture and the morphing of the material and the digital in the Internet of Things (IoT). A somewhat restless journey, no doubt. But positioning the various pathways vis-à-vis Karl Polanyi's stand should prevent us from losing orientation.

Keywords: Platforms; Internet of Things (IoT); asset-light business model; datafication; Polanyi.

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"Whereof one cannot speak, thereof one must be silent."
— Ludwig Wittgenstein, *Tractatus Logico Philosophicus*, Prop. 7.

"Everything that can be said, can be said in passing."
— Elfriede Gerstl, *Spielräume*

1 From Prophetic Script to Pattern of Thought: Thinking With and Beyond Polanyi

1.1 The Leonard Cohen-Principle

Still controversial, still inspiring: such is the work of Karl Polanyi. While it is easy to find inconsistencies in Polanyi's œuvre, it can also be read, and more constructively, "with an eye to its programmatic purpose, methodological potential, and guiding spirit" (Peck, 2013, p. 1551). "Perhaps", as Gudeman (2001, p. 84) reasoned, "Polanyi did not write with the erudition of Mauss, the grace of Malinowski, or the force of Lévi-Strauss, but he is persuasive for his ideas if not his data." Polanyi's style was expositional, moving "back and forth between metaphor and metatheory", but which nevertheless crystallized around "a series of constant causal arguments" across an impressively broad spectrum of conjunctures (Block & Somers, 1984, p. 71).

Very much in this spirit, our framing of the emerging platform economy through a Polanyian optic (Grabher & König, 2020) was animated by the ambition to appreciate Polanyi's writing as a "pattern of thought" (Polanyi Levitt, 1990, p. 1). We emphatically did *not* seek to side with the strand of Polanyi exegesis that is committed to a hagiographic transfiguration of Polanyi, nor were we interested in joining the quest of identifying *the* authentic Polanyian voice in his rather polyphonic contributions to various (disciplinary) debates. If 75 years of exegesis and a new wave of studies, aimed at the intellectual and historical contextualization of his work (see, for example, Buğra & Ağartan, 2007; Brie & Thomasberger, 2018; Dale et al., 2019) arrived at a widely-shared conclusion, it is this: it remains presumably impossible, but certainly unnecessary, to agree on a single legitimate reading of Polanyi (Luban, 2017, p. 76).

For one, even Polanyi's canonical concepts — embeddedness, fictitious commodification, double movement — prove surprisingly elusive upon closer inspection (see, for example, Cangiani, 2011, pp. 190–194; Dale, 2011a; Deutschmann, 2019, pp. 35–59). The emblematic ambiguity of Polanyi's writing might be attributed to the "volatility of his intellectual journey" and his "enthusiasms for the most diverse thinkers" (Dale, 2011b, pp. 160–161). More importantly, however, it seems exactly Polanyi's ambiguity that has made his thought so fertile: "There's a crack in everything, that's how the light gets in", as humanistic scholarship asserts (Leonard Cohen). The project of thinking with and beyond Polanyi derives its progress and passion not from some easy, yet stabilized consensus, but from ongoing negotiations between conflicting attributions and interpretations: "coordination through misunderstandings" in a truly heterarchic search (Stark, 2009, pp. 190–195).

For another, beyond questions of interpretation, critique of Polanyi's work itself has become an integral strand within contemporary Polanyian thought (Holmes, 2019, p. 2). Whereas the defensive endeavor to protect the true heritage of Polanyi from any contemporary contamination confines itself to a pedantic dissection of ever more nuances in Polanyi's writing, it is the scholarship that deliberately suspends the imperative of unconditional faithfulness to the original that offers most compelling perspectives on contemporary issues.

In fact, deliberate dissociations from the original writing that do not flinch from reasoning explicitly *contra* Polanyi, have produced most powerful advancements of the canonical notions of double movement (Fraser, 2017a; 2017b) and embeddedness (Deutschmann, 2019, pp. 18–29) as well as of Polanyi's controversial reading of English economic history (Block & Somers, 2014). These achievements (prefaced with the ceremonial reassurance of a *sympathetic* appreciation of Polanyi's reasoning) seem to converge towards a post-Polanyian approach of inquiry that is: (1) *relational* (positioning specific configurations within a wider context of coexisting and conflicting modes of exchange and regulation), (2) *processual* (exploring ongoing processes of marketization) and (3) *institutional* (foregrounding the regularized dimensions of marketization) (Peck, 2020, pp. 67–68).

Motivated by the intention to advance such a post-Polanyian perspective, the key arguments of the current essay are developed along three angles towards Polanyi's writing. By reasoning *with* Polanyi, the subsequent section reiterates the agentic qualities of machinery for understanding the dynamics of platformization. After briefly departing from Polanyi's problematic conception of the social, the essay subsequently verges back to Polanyi by elucidating the analytical power of the notion of embeddedness to conceptualize digital platform labor. Reversing direction again, the argumentation moves *contra* Polanyi: the supposed absence of the double movement is attributed to the asset-aversion of platform orchestrators and the framing of platform labor as independent entrepreneurship; and rather than perceiving data as an object of fictitious commodification, they are apprehended through the optic of assetization. Finally, by pushing *beyond* Polanyian terrain altogether, the essay explores the platformization of manufacturing and agriculture and the morphing of the material and the digital in the Internet of Things (IoT). A turbulent journey indeed. But, hopefully, the serpentine path will yield some unexpected vistas.

1.2 Liaisons Dangereuses? The Delicate Proximity to Kondratiev and Technological Determinism

These reflections on the generative ambiguity of Polanyi's thought and the explanatory power of a post-Polanyian perspective, however, should not be read as lengthy justification for a retreat from the Polanyian positions we advanced in the original essay (Grabher & König, 2020). The current essay is not a confession, nor do we seek absolution. Rather than remorsefully offering some sort of pacifying compromise, we stand our ground, particularly with regard to the catalyzing role of technology.

First, Pais and Provasi (2020, pp. 1–2) seem to insinuate that our discussion of the machinery of the Industrial Age boils down to a mono-causal, technologically-deterministic understanding of long-term economic transformations. We are closer to Kondratiev than to Polanyi, is the verdict. However, our framework is emphatically a multi-dimensional approach that seeks to elucidate the interdependencies between technological affordances, performative effects of science and the reconfiguration of regulatory institutions. As such it rather resonates with the multiplexity that permeates the development and industrialization theories of Wallerstein (1979), Gerschenkron (1962) or Landes (1970) than with Kondratiev's narrow technological determinism. Regardless where the closest resemblance amongst these theories eventually is located, the affinity to related theories does *not* disqualify our approach as non-Polanyian. On the contrary, we seek to honor Polanyi's embracive perspective that is perhaps more aptly expressed in the *plural* of the working title "*Origins of the Cataclysm*" than in the singular of the final label "*The Great Transformation*".

Second, we in fact regard it as a particular contribution of our proposal to re-introduce the role of technology into a debate that more recently has mainly revolved around institutional and political dimensions of a double movement (and an apparent absence thereof) and around rather mechanistic perceptions of an oscillation between more and less embeddedness. For all the ambiguity (generative or not) of his writing, Polanyi is exceptionally plain when it comes to the transformative role of machinery (Polanyi, 1944/2001; pp. 12, 44, 75–76, 92, 98). He widens the perspective from the preoccupation with the introduction of a novel apparatus (that can analytically be isolated as "technical progress") to the economic prerequisites and societal ramifications of the new production regime: the sweeping commodification of inputs, and of labor in particular (Markantonatou & Dale, 2019, p. 58). Polanyi (1944/2001, p. 92) leaves little room for any misgivings when he invokes the steam engine that "was clamouring for freedom and the machines [that] were crying out for human hands".

Whereas contemporary social science habitually foregrounds the plasticity of technology as "affordance" (Gaver, 1991), Polanyi stresses the institutional conditioning of technology (at times, in fact, with an ostentatious argumentation that verges on determinism). Just as any conceptualization of the breakthrough of industrial capitalism that does not account for the momentous impacts of machinery remains partial, the emergence of the platform economy cannot be conceived without incorporating the agentic qualities of server facilities, cable grids, satellites, chips, routers or smartphones (the "D" for devices in Caliskan's (2020) imaginative DRAN-proposal).[1]

2 From Performativity to Performances: What about People in Transformations (Great and Small)?

2.1 Beyond Polanyi's Dualist Grammar: The Variety of Societal Counter-Movements

The role we ascribe to technology in our Polanyian framing of platforms (Grabher & König, 2020) has also motivated Lee and Watkins (2020) to voice critical concerns and, in fact, to propose an extension of our perspective onto a most consequential interrelation: people and platforms. Inspired by interactionist and social constructivist understandings, Lee and Watkins (2020, p. 3) suggest to center on "how people creatively interact with and work alongside the nonhuman actants that populate and shape pour worlds". Their intention, phrased differently, is to shift attention from technological *performativity* to people's *performance* of technologies. Lee and Watkins (2020) indeed identify a crucial void in our framework that, despite all its alleged Polanyian ethos of multiplexity, is categorically silent on something more than a detail: people. And our omission is not even of the flattering type of a deliberate decision against a particular explanatory variable, but rather of the kind of distorted vision. But, of course, Polanyi is ultimately to blame for this.

Polanyi's perception of the non-economic (to which "people" obviously belong to), once more, has been object of persistent critique (see, for example, Hodgson, 2016). The interrelation between the economic and the non-economic is reduced to the simple binary formula of economy *vs.* society, of planned effort (to extend the reach of markets) *vs.* spontaneous

1. The scholarship in the Actor-Network (ANT) tradition, Caliskan (2021) maintains, evolved into a research program that added two particular analytical angles to the original proposal, (D) Devices and (R) Representations, and hence extended the ANT- towards a DRAN-approach.

response (determined to repel this incursion) — ultimately of: bad *vs.* good.[2] Nancy Fraser (2017a; 2017b) has launched the presumably most trenchant critique of this binary that neglects the emancipatory dimensions of markets (that not only brought "dark satanic mills" but also freedom), and jams everything non-economic into the black box "society". By conflating the distinctions between state and civil society; private and public spheres; and nations and local communities, this binary obscures the social structure of society. Moreover, the normative resonances of the economy *vs.* society dichotomy suggest a "cold, dangerous, and volatile economy undermining a warm, safe and stable society" (Fraser, 2017b, p. 7). But, as Fraser insists, "society" is hardly unequivocally virtuous, and Polanyi's reification of society "encourages us to overlook its nasty aspects, including sexism, racism, homophobia, and exclusionary provincialism. Nor is stability an unmitigated good" (2017b, p. 7).

Fraser also most compellingly exemplifies how a rigorous critique of Polanyi's reasoning yields more powerful insights than devoted attempts to salvage Polanyi from his own flaws (see, for example, Prudham, 2020). Rather than lamenting on what is absent (a double movement), she inquires that which is present: emancipatory movements such as feminists, anti-racists or anti-colonialists who cannot be projected onto either side of Polanyi's binary theorem as they fight against the repressive impacts of both, markets *and* society. Championing neither marketization nor protection against it, they espouse a third agenda of *emancipation* (Fraser, 2017a, pp. 36–38).

2.2 And Back to Polanyi: The Dialectics of (Dis)Embeddedness of Digital Labor

Once more, however, incisive critique does not invalidate a Polanyian perspective in general. In the spirit of a critical reconstruction, Polanyi's reasoning proves instructive in conceptualizing people's performances of technology "in the wild" that Lee and Watkins (2020) set their sight on. Viewed through Dale's (2010) analytical lens that reveals a "soft" and a "hard" Polanyi, the notion of embeddedness affords an instructive approach to conceive, for example, the performance of platforms that arbitrate digital labor. In their extensive study of remote digital gig work, ranging from data entry over translation to software programming, in Southeast Asia and Sub-Saharan Africa, Wood et al. (2019) examine how platforms such as Upwork and Amazon Mechanical Turk induce a dialectical dynamic of dis-embedding and re-embedding labor.

The hard-Polanyi perspective of embeddedness is firmly anchored in the fundamental critique of marketization and unravels the efforts necessary to break labor free from "the rest of life" (Polanyi, 1944/2001, p. 76). In order to transform work into "mere chunks of raw material" (Polanyi, 1977, p. 9), it has to be freed from established cultural norms and legal regulations that interfere with the further expansion of the market logic into society (see also Thompson, 1963). This process of institutional dis-embedding is a prerequisite for construing platform labor as a resource that can be purchased and dispensed with unimpeded and frictionless "on-demand" (Wood et al., 2019, p. 942). To reap the benefits of the "asset-light" business model (Parker et al., 2016, pp. 68–70), platform orchestrators vigorously defend (through countless litigation cases across a multitude of jurisdictions) the key premise on which their self-conception as neutral intermediaries is built: gig-workers are independent "contractors" who, categorically, do not qualify as "employees" (with corresponding legal entitlements) (Grabher & van Tuijl, 2020, pp. 1010–1011).

2. The dualist grammar in Polanyi's reasoning resonates with Ferdinand Tönnies' well-known couplet, *Gemeinschaft* (community) and *Gesellschaft* (society) that exerted significant influence on Polanyi's "confection of ideas" (Dale, 2011a, pp. 309–310).

The soft-Polanyi perception of embeddedness, championed by the new economic sociology built around the paramount contributions of Mark Granovetter (1985), scales down the focus from societal institutions to the analytical level of concrete personal relations and networks (Dale, 2011a, pp. 325–329). The confrontation of hard and soft readings reveals the dialectics of (dis)embeddedness of remote platform labor. At the same time as *normative disembeddeness* exposes the digital gig workers in Southeast Asia and Sub-Saharan Africa to the vagaries of unregulated labor markets, these workers forge *network embeddedness* to cope with these very market volatilities (Wood et al., 2019). Through network embeddedness, gig workers create relational resources that help them to negotiate the low-trust nature and isolation of remote digital labor and that offer mutual practical and emotional support: collective practices that Lee and Watkins (2020, pp. 3–4) aptly label as "articulation" and "opposition". This imaginative reading by Wood et al. (2019, p. 946) demonstrates that *network embeddedness* is instructive for understanding *how* work gets done, whereas normative embeddedness is useful for apprehending the *conditions under which* the work is done.

3 From Double to Supporting Movement: Economic Benefits of Platforms (Whereof One Rather Should not Speak)

3.1 Can Platforms do Good? Leveraging Opportunities

The taxonomy of "performances in the wild" proposed by Lee and Watkins (2020) reveals a variety of resourceful practices through which people deploy, appropriate or work around platform technologies. The classification of practices into the categories "innovation", "articulation" and "opposition", however, seems to be biased towards (varying degrees of) flouting platform technologies. Even "innovation" seems to presuppose some degree of transgression *contra* the prescribed mode of using technologies. But what about an employment of platform technologies for individual benefit that is not just deliberately in line with the overall intentions of the platform orchestrator, but also in compliance with every pedantic detail of the Terms-of-Service?

The point here is not to find fault in a taxonomy, but to highlight that compliant performance practices that might be labelled "leverage" offer tangible economic benefits by topping up household income. The roughly 2,9 million hosts on Airbnb earn a monthly income of $924 on average (Goldschein, 2020) (as of September 9, 2020). On Upwork, 3 million jobs worth roughly $1bn are posted annually; and the income generated by digital labor platforms is estimated to reach $505mn per year worldwide, though distributed extremely uneven across socio-demographics and global geographies (see, for example, Wahome & Graham, 2020).

Adding to these *supply*-side benefits (for the Airbnb host and Uber driver), the real and perceived *demand*-side advantages (for the Airbnb guest and the Uber passenger), brings us also closer to answers of the question of the apparently missing double-movement against the further assault of (normative) dis-embeddedness of labor launched by platforms. Although our Polanyian framing of the platform economy (Grabher & König, 2020) was explicitly *not* concerned with this apparent puzzle posed by Pais and Provasi (2020, p. 3), advancing tentative answers to this question appears promising since they foreground the unfolding *processual* dynamics of platform*ization* that Caliskan (2020, pp. 5–6) compellingly advocates for in his critique.

Yet again, Fraser (2017a, pp. 33–34) offers a most cogent analysis of the only *half*-Polanyian character of the contemporary political constellations: while the structural logic

of intensified commodification seems intact, the expectation of a double movement has been frustrated. The linchpin of her reasoning is the fundamental transformation from a capitalism based on industrial production to one in which "capital prefers, when possible, to bypass the risky business of production" (Fraser, 2017a, p. 33). In the industrial era workers possessed considerable clout since spatial concentration facilitated organization that generated a tenacious constituency and political base for the protective pole of a double movement.

In the current conjecture, however, platform orchestrators effectuate this preference "to bypass production" in a most resolute fashion by capitalizing on the promises of the "asset-light" business model. In fact, the (market) valuation of platform orchestrators does not reflect their control of (physical) assets but, quite diametrically opposed, their capacity to evade accountability for assets and the responsibilities implicated with ownership (Grabher & van Tuijl, 2020, pp. 1008–1009). Although we are presumably multiple "great transformations" away from a "capitalism without capital" (Haskel & Westlake, 2017), platformization further shifts the standard registers of economic accounting (and valuation) from the tangible (like factories and machinery) to the intangible (like knowledge and branding) (Mauboussin & Callahan, 2020, pp. 3–4).

3.2 Beyond Class Distinctions? The Revolving Identities of Platform Users

Of no less importance for understanding the missing second half in Polanyi's structural logic is the fact that "the class division between labor and capital ceases to appear self-evident" (Fraser, 2017a, p. 33). The erosion of this previously crisp boundary gains particular momentum with the framing of gig work in terms of autonomy, flexibility and low-entry requirements. By accentuating these favorable aspects of freelancing, gig work is reattributed as free enterprise. And in fact, at least for the segment of part-time gig workers, this framing corresponds with the subjective experience and self-conception as entrepreneurs (Berger et al., 2020) that, at the same time, of course, also involves hardly mitigated exposure to existential risks and unpredictable demand (Peticca-Harris et al., 2020). At this point, Polanyi's (1957, pp. 116–117) passionate rejection of the idea that rent-seeking behavior is inextricably woven into human *nature* as an innate "propensity to truck, barter and exchange" appears inch-perfect. Rather, platform orchestrators afford the institutional and ideological *context* that compel actors to pursue their self-interest by monetizing "underutilized" individual and domestic assets (see also, Grabher & König, 2017).

The Airbnb Citizen Initiative is paradigmatic here: it seeks to transform the disperse collective of platform hosts into a global community, even a social movement, of middle-class entrepreneurs who seek to supplement their income in a climate of economic insecurity and technology-enabled opportunity: "Our people-for-people platform allows ordinary people to use their house — typically their greatest expense — to generate supplemental income to pay for costs like food, rent, and education for children" (Airbnb Citizen, 2017). Positioning itself as a beacon of entrepreneurial opportunity, Airbnb has effectively scaled and legitimized the transformation of the most intimate personal space of the home into a business asset. Airbnb, then, provides the operating system for reworking the relation between "people", market and the state on the municipal level, by "normalizing and intensifying household practices of financial calculation, competition, and (micro-)enterprise" (van Doorn, 2020, p. 1819).

The self-evidence of traditional class distinctions is further obscured by a central feature of two-sided market places with low entry-barriers (such as Airbnb, Uber or Upwork): switching from the side of entrepreneurial producer to the side of gratified consumer (and back in

the subsequent transaction) is not only a near-frictionless real opportunity, but also a practice embraced by platform users to enhance credibility and trustworthiness among strangers: every respectable Airbnb host boasts of the extensive travel record — acquired as Airbnb guest, of course. The experience of tangible economic benefits as entrepreneur or as consumer or, emblematically, as both, as well as the framing exercises of platform orchestrators also provide clues for understanding the virtual absence of a potent double movement.

Although November 3rd, 2020 might be remembered for different reasons (as the day of the US presidential elections), it was also the day on which the pivotal premise of the "asset-light" business model of platforms was at stake. In California, a key arena for legal disputes over the status of gig workers in the platform economy, 58% of voters opted for Proposition 22. This ballot measure, sponsored by Uber, Lyft and the delivery platform DoorDash with a $200mn campaign, allows platform orchestrators to continue to treat gig workers as "independent contractors" (*The New York Times*, 2020a). "Society", put bluntly, opted for "commodification" and against a protective "double movement". The weight of this verdict (which does not even apply on a national scale) for the viability of the "asset-light" business model can be read off from the $20bn boost of market capitalization for Uber and Lyft in the subsequent week (*The New York Times*, 2020b).

4 From Commodity to Asset: Data = Oil?

4.1 Looking Back: Two Karls, two Polanyis, and the Quandary of Commodification

As much as the machines of the Industrial Age ushered in the commodification of labor, the new digital infrastructures of platforms, as we argued previously (Grabher & König, 2020, pp. 105–106), precipitate the commodification of data. While Kenney, Zysman and Bearson (2020, p. 18) are to some extent drawn to this analogy, they also voice substantial concerns about this categorization of data, since "it is uncertain how much greater analytic precision is gained by labelling it a fictitious commodity" (p. 14). By positioning themselves closer to Marx than to Polanyi, they bring an omission in our Polanyian perspective to the fore. While both Karl's anatomize the capitalist logic of all-embracive commodification (through the corresponding notions of commodity *fetish* and commodity *fiction* respectively), Marx affirms that commodities are not "things" with an inherent value (see also Özel, 2019, p. 138). Rather, value has to be extracted and appropriated through historically specific social relations. Is this analytical juncture the point where we should leave Polanyi behind (again) in order to more adequately categorize data — by moving either back to Marx or rather forward to contemporary accounts?

As regards a glance backwards, it seems not without irony that Marx (writing roughly a century earlier), particularly in the *Grundrisse*, appears more amenable to an understanding of the role of knowledge[3] in the present knowledge economy than Polanyi. With his discussion of the "general intellect", Marx adumbrated a conception of knowledge as a generic factor

3. If more than two decades of debating the knowledge economy has drummed one thing into us, it is this: data and knowledge are not the same. In fact, they occupy very different positions in the data-information-knowledge-understanding-wisdom hierarchy that dates back to Ackoff (1989). In the current context, though, we gloss over the fundamental differences and focus on the economic features they both share as a specific kind of a "troublesome commodity" (Gandy, 2011, p. 436).

of production that cannot be fully appropriated privately (Marx, 1857/1974, p. 206).[4] Perhaps even more ironically, Karl Polanyi's younger brother Michael continues to exert a more sustained influence on debates on knowledge, in particular through his conceptualization of "tacit knowledge" (Polanyi, 1966) that is geographically "sticky" and neither can be fully codified nor be circulated without friction (Tödtling, 2020; see also Gertler, 2003).

Nevertheless, of course, (Karl) Polanyi's theorizing on commodification has provided inspiration for theorizing knowledge-based capitalism. Most prominently perhaps, Michael Burawoy (2010, p. 310) has pondered the question if knowledge represents the "fourth fictitious commodity" and, rather than proposing an unequivocal verdict, advanced instructive differentiations. True, analogous to the fencing off of common land, common knowledge can be partitioned and turned into intellectual property (Cangiani, 2020). As subject of commodification, knowledge is disembedded from its societal contexts so that the primary register of governing the advancement and use of knowledge "becomes profitable/unprofitable rather than true/false, sacred/profane, healthy/diseased" (Jessop, 2007, p. 120). Also true, similar to the double movement against the commodification of labor, the enclosure of common knowledge into intellectual property is provoking resistance (Burawoy, 2014) as, for example, the EU General Data Protection Regulation (GDPR) as well as the staunch defense of open-source initiatives (Reitz, 2019, pp. 200–201) indicate. Interim conclusions: Commodification of knowledge? Yes. But transformation of knowledge into a fictitious commodity? Not sure.

In seeking answers to the latter question, Burawoy (2010, p. 310) accentuates a feature of fictitious commodities that our simple formula (data = fictitious commodity) did not take into adequate consideration. For Polanyi, a fictitious commodity has the form of a commodity (can be bought and sold), but actually was not produced in order to be sold. And crucially (and therein lies our inattentiveness), the commodity fiction disregards "the fact that leaving the fate of soil and people to the market would be tantamount to annihilating them" (Polanyi, 1944/2001, p. 137). Although labor, land and money are essential in a market economy, Polanyi (1944/2001, p. 73) warns that "no society could stand the effects of such a system of crude fictions [...] unless its human and natural substance was protected against the ravages of this satanic mill". Knowledge and data, however are not afflicted with this self-destructive dimension of fictitious commodities since they represent a particular class of "troublesome commodities" (Gandy, 2011, p. 436): They obviously are not *scarce* resources and their utilization is *non-rivalrous* (utilization by one actor does not preclude utilization by another), while the marginal costs of reproducing data is essentially zero (Romer, 1990).

4.2 Looking Ahead: From Commodification to Assetization

The glance back, to *both Karls* and to *both Polanyis*, then, yields insights that obviously are only partially instructive for conceiving the nature of data in a contemporary context. Looking beyond the writings of these three titans (that unavoidably also reflect the industrial capitalism at the time of their genesis) reveals a perspective that promises to perceive current capitalist development in a more incisive fashion: *assetization* (Birch & Muniesa, 2020). Whereas (Polanyian) commodities are bought and sold on markets according to a market price that signals *present* supply and demand (very much as neoclassical marginal utility theory would suggest), the value

4. "The development of fixed capital", as Marx (1857/1974, p. 206) proclaims, "indicates to what degree general social knowledge has become a direct force of production, and to what degree, hence, the conditions of the process of social life itself have come under the control of the general intellect and been transformed in accordance with it."

of assets resides in its capacity to generate revenues in the *future* (see also Langley, 2020, p. 3). The value of a commodity is signaled by its price at the specific point of exchange, the value of an asset in principle is dynamic and can be assessed through discount techniques (such as Discounted Cash Flow (DCF) or Net Present Value (NPV)) that calculate future earning power (Doganova, 2018). More generally, the concept of assetization emphasizes the socially transformative character of the phenomenon of turning things into assets (Birch & Muniesa, 2020, p. 4).

The transformation of data into a "new asset class" (Zuboff, 2019) is vividly expressed in the industry refrain that portrays data as the "new oil" that has to be "refined" by specialized corporations (Couldry & Mejias, 2018, p. 340). Although Kenney, Zysman and Bearson (2020, p. 13) are on solid ground with their assertion that data "has no particular *social actor* associated with it" (emphasis added), datafication has engendered at least a dedicated *industry* of data brokers. Despite the size of this business, currently estimated at $1.4trn (*The Economist*, 2020a), this industry dexterously operates in the shadow of regulatory oversight and public awareness (Crain, 2018, pp. 88–89) — or have you ever heard brand names such as Acxiom, Experian or Equifax, key players in this industry? Omnipresent, yet hardly visible, these companies are part of the "Big Other", the corporate infrastructures of "reality mining" (Zuboff, 2019).

Today's major data brokers evolved from small companies initially specialized in processing data into client-specific products, such as credit scores (Experian, Equifax), political marketing (Acxiom) or loyalty programs (Alliance Data). By aggregating diverse bodies of data, these companies leveraged "data network effects" (Gregory et al., 2020) that galvanized multiple rounds of consolidation culminating in the current major brokers with their extensive portfolios (Bouk, 2017). Phrased in the trade jargon, the cloud-based Acxiom Audience Operating System (AOS), for example, enables "marketers to connect all types of traditionally disconnected data and — for the first time — to create a truly singular view of the consumer" (Acxiom Corporation, 2013).

These major data brokers are not in the business of trading (personal) data as a commodity that, as a generic resource, provides an input for a multitude of production processes. Data in this line of business rather represent an asset that has to be repurposed and refined to match the needs of specific client firms in the ever extending marketing space (see also Turow, 2012; Birch et al., 2020). The asset (so-called first-party data) derived from purchase history, browsing data, responsiveness to marketing, and location data is then transformed into diverse products (so-called third-party data) (Beauvisage & Mellet, 2020, p. 88). Exemplary products are audience segments describing lifestyles and consumption patterns (such as the Personicx sociodemographic segmentation of Acxiom), enrichment of existing databases (by adding variables to the customer's CRM data base) or risk calculation (scoring and profiling based on purchase history particularly for the banking and insurance sectors) (Beauvisage & Mellet, 2020, p. 85). The assetization of data, then, unfolds in a combination of capturing and repurposing data into "prediction products" that open up multiple streams of future income on "behavioral future markets" (Zuboff, 2019, p. 8).

By reversing the perspective from subject to object, Zuboff (2019, pp. 233–234) elucidates that this extraction of products from assets is inextricably interwoven with the transformation of human beings into bundles of behavioral traits that are tracked, measured and indexed. This transformation amounts to nothing less than the "dispossession of human experience" through "rendition" which comprises the "concrete operational practices through which dispossession is accomplished, as human experience is claimed as raw material for datafication and all that follows, from manufacturing to sales". These "renditions" resonate with Caliskan's (2020, p. 9)

"representations" (the "R" in his proposed DRAN-framework) that "not only represent, but also contribute to the making of realities". And while these practices in managerial accounts are eulogized as enhancements of user value by offering "individualized experience" (Gregory, 2020, p. 4), Zuboff (2019, p. 241) makes plainly clear that these practices are "typically unauthorized, unilateral, gluttonous, secret, and brazen" (see also Langlois & Elmer, 2019).

5 From Thing to Process: Trajectories of Platformization

5.1 Platform Architectures: Fragile Stacks or Robust Hierarchies?

The conspicuous accentuation of the strategies and practices of asset*ization* (in this paper), however, cannot disguise the contorted perspective that Caliskan (2020, p. 5) identified (in our previous essay): we all too frequently lapse into an objectification of the platform economy as a self-contained and already consolidated system of economic interactions. The optic of platform*ization* brings those conflictual processes into sharper focus through which platforms seek to establish themselves as "obligatory passage points" (Callon, 1986) into ever expanding domains of production and transaction. Moreover, an *ization*-perspective seems definitely more in line with Polanyi as the "theorist of discontinuity" (Block & Somers, 2017, p. 380). By envisioning platformization as an open and dynamic process propelled by actors, representations and devices, it pertains to "the interpenetration of digital infrastructures, economic processes, and governmental frameworks of platforms in different economic sectors and spheres of life" (Poell et al., 2019, p. 6).

While Caliskan's critical comment on our tendency of objectifying the platform economy is very well taken, his proposal to construe the mutually enabling economic practices of platforms as "stack economization" (Caliskan, 2020, p. 6), however, does not really appear fully apposite. The layered architectures of platforms, no doubt, are imaginatively visualized as a collection of "stacks" (Bratton, 2016): server facilities and cable grids, cloud computing and big data analytics, smart phones and mobile apps, reputation scores and rating systems, all add up to a complex socio-technical apparatus (Andersson Schwarz, 2017). And yet, by conceiving platform-based economic practices in terms of layered architectures, the trope of stacks tends to conceal three critical aspects.

This construal, first, insinuates that single layers can unproblematically be separated from the larger socio-technical infrastructures through which they operate. Platformization, however, defies the distinctiveness and crisp conceptual boundaries of key notions from which this process unfolds (such as firms, markets, producers, consumers) and through which novel modalities of "managerial governmentality" between state and economy emerge (Grabher & König, 2020, pp. 108–109). Second, rather than an a random aggregation of equivalent stacks, the layered architectures of platforms are fabricated according to strict hierarchical designs. Extreme power asymmetries (Cutolo & Kenney, 2020), to which Caliskan's (2020) Foucauldian reasoning also alludes to, in fact, catalyze subsequent phases of platformization. And finally, the image of stacks conveys a sense of stasis and, at least for its more complex manifestations, of perturbability (a single tap, as we know from the irrefutable laws of nursery physics, causes the stack to collapse). Platformization, however, is evidently about potent processes that, if only temporarily, amalgamate into robust hierarchical constellations solidified through "winner-takes-all" dynamics (Parker et al., 2016).

5.2 Platform Trajectories: Geographies of Encroachment

While the trope of the "stacks", then, affords a somewhat distorted view on platforms (Donavan, 2019), the platformization perspective yields insights into the expansive strategies and practices of platform orchestrators to control access to an ever expanding spectrum of economic and societal domains (Grabher & van Tuijl, 2020, pp. 1008–1009). These strategies, obviously resilient to pandemics and politics, have further affirmed the economic position of the major US-players, Alphabet, Amazon, Apple, Facebook and Microsoft[5] who leverage three powerful dynamics (van Dijck, 2020, pp. 8–10).

First, by expanding *vertically*, platform orchestrators aim at converting the digital infrastructures into service models through the integration of hardware configurations, cloud architectures and data analytics: the "platformization of infrastructure" (Plantin et al., 2018). Integrated into Apple Pay, for example, is a dedicated built-in NFC chip in Apple smartphones that rival pay systems cannot deploy (Shao, 2020). (Hardware) devices and (software) representations are platformized to consolidate the platform business group's position: "platforms rise when infrastructures splinter" (Plantin et al., 2018, p. 300). What is praised as "seamless integration" for the sake of "user convenience", at the same time, causes severe inconvenience due "user lock-in" through the funneling and appropriation of data flows (Van Alstyne et al., 2016).

Second, by moving *horizontally*, platform orchestrators morph into infrastructures for users by establishing themselves as vital obligatory passage points: the "infrastructuralization of platforms" (Plantin et al., 2018). The more contents can be channeled through these obligatory passage points, the more data can be mined, combined and repurposed in order to strengthen the position in the ecosystem. Those who control this obligatory passage points, constitute the core of the entire ecosystem: the self-organized, self-governed and highly exclusive (literally) handful of key players (van Dijck, 2020, p. 9). You need access to a large network? Facebook. You seek access to customers? Amazon. You search (for whatever)? Google. The key players, however, are not just exclusive (on the demand side), but also interdependent (on the supply side). Apple's iCloud, for example, runs on AWS (Amazon Web Services) and Microsoft's Azure, and Facebook is dependent on access to the app stores of Apple and Google. Rather than confining rivalries to the temperate modalities of "coopetition", these interdependencies, however, are also arenas of fierce attacks, as Apple's recent foray into Google's core domain of the search business indicates (*The Financial Times*, 2020b).

Third, platformization becomes even more pervasive as orchestrators expand their influence *cross-sectoral*. The sweeping expansion across sectoral boundaries is driven, predictably, by motives of data capture and, more specifically, by the prospects to collect and combine personal data and behavioral patterns from a multitude of diverse yet related sectors (see also, Beauvisage & Mellet, 2020). Amazon, spearheading platformization across sectors, has more recently entrenched itself in the pharmaceutical, insurance and, most conspicuously, the logistics sector[6]

5. The combined sales of Alphabet, Amazon, Apple and Facebook leapt 18 per cent year on year in the third quarter of 2020, to $227bn, while after-tax profits jumped by 31 per cent, to $39bn (*The Financial Times*, 2020a).

6. While traditional logistics is driven by demand-pull in which the customer's order triggers the sequence from packaging to delivering, Amazon has shifted to supply-push logistics based on predictive analytics (Butollo, 2020, p. 12). The ever shrinking lead times entail a fundamental departure from the platform mantra of the "asset-light" business model: Amazon owns physical assets valued at $104bn which is not far from the $119bn of physical assets of its old-economy rival Walmart (*The Economist*, 2020b). The 7 air hubs, 53 Amazon Now Hubs, 47 Sortation Centers, 187 Fulfillment Centers and 250 Delivery Stations of Amazon in the United

(see also Caliskan, 2020; Kenney & Zysman, 2020). In 2018, Amazon launched a software platform for extracting information from medical files (Amazon Comprehend Medical), acquired PillPack, a major US online pharmacy (Shaya & Eddington, 2020), and launched a healthcare insurance unit (Haven) for its 1.2 million employees. Through cross-sectorization, Amazon (theoretically) could offer a one-stop shop for diagnostics, ordering and delivering of medication, and already (practically) controls the relevant data streams (van Dijck, 2020, p. 9).[7]

Through vertical and horizontal integration as well as cross-sectorization, the major orchestrators attain a highly precarious balance "by carving out spaces for their own platform functionalities, while opening up to rivals in other areas; by coordinating online space with other major players while competing in other segments, and by integrating their own platforms vertically while maintaining competition in 'oligopolistic' platform markets" (van Dijck, 2020, p. 10; see also Dolata & Schrape, 2018).

6 From Digital to Material: Novel Hybridities in Industrial Platforms

6.1 Limits to the Winner-Takes-All Logic: Materiality and Domain Knowledge

The vertical and lateral moves of cross-sectorization not only amount to an intrusion into ever more digital domains, but crucially also imply a shift from *transaction* to *production*, from *service* to *manufacturing* (Caliskan, 2020, p. 6). Polanyian perspectives, as social science expositions of platformization more generally, so far, have centered on the empirical realities of business-to-consumer and peer-to-peer transactions (see also Grabher & van Tuijl, 2020, p. 1006; Menon et al., 2020, p. 364). Exemplary accounts confront questions of commodification of labor (Cangiani, 2020, p. 180) and knowledge (Reitz, 2019), double movements (Pais & Provasi, 2020; Wood et al., 2019) or market regulation (Block, 2020, p. 91); others seek to salvage notions of a "sharing economy" by panning the spotlight onto phenomena that are theoretically interesting, societally noble, but empirically increasingly marginal, like timebanks, for example (see, for example, Arcidiacono, 2018). The attempts to corroborate sharing as a distinct — and viable — mode of integration resonates with Polanyi's (1957) emphasis on the variety of moral principles and institutional rationalities of distribution; the epistemological privilege of institutional aspects at the expense of socio-technical dimensions of platforms, however, appears somewhat *non*-Polanyian — given the holistic ethos of his agenda.

Recalibrating the optics onto the business-to-business realm of industrial platforms, of course, is not merely a matter of empirical relevance or unbiased research focus. Rather, the materiality of production and products on *industrial* platforms conditions specific trajectories that systematically differ from the platformization in the realm of *consumer* transactions (Sturgeon, 2019, pp. 14–16; Menon et al., 2020). Consumer platforms (like Airbnb and Uber) can be scaled rapidly on a global scale by leveraging network effects on a massive scale and by benefitting from (close-to) zero marginal costs (Constantinides et al., 2018, pp. 389–390). The offerings of industrial platforms (like Volkswagen's RIO or MyJohnDeere, for example), in contrast, are inextricably tied to materiality of the products (the truck or the combine harvester)

States alone account for a total footprint of 15.9 km² (Rodrigue, 2020; see also Kenney & Zysman, 2020, pp. 63–69).

7. Amazon is truly "prime" when it comes to converting data streams into income streams: expanding the portfolio of offerings from "Software as-a-Service" (SaaS) (with AWS) into ever more domains such as "Supply Chain Management as-a-Service" (with FBA) is the strategy, and "Everything as-a-Service" (EaaS) is the ultimate goal (Sturgeon, 2019, pp. 6–7).

and, hence, can only be scaled within the confines of the specific industry (Sturgeon, 2019, pp. 14–15). Whereas the proliferation of consumer platforms is driven by winner-takes-all dynamics, the development of industrial platforms is limited by the fragmentation of product markets and industry-specific knowledge domains (Sturgeon, 2019, pp. 14–15).

The industry-specific corridors of industrial platformization, of course, also shape the far-reaching reconfigurations of the material and the digital. Whereas the materiality of products and processes of the past was reduced to the isolation of "dumb" stand-alone devices, the novel generation of "smart" devices features digital capabilities of sensing, storing, analyzing and actuating data. Hardware and software morph into an industrial "Internet of Things" (IoT)[8] (Ashton, 2009) in which materiality is tightly woven into a digital capillary braid that circulates ever growing flows of data.

6.2 Cars and Combines: "Roving, Metallic Algorithms"

Smartness is a function of connectivity, and the automotive sector presumably proceeds along the steepest vector of enhancing connectivity of industrial production and products (Paunov & Planes-Satorra, 2019, p. 24). On the level of production, the "smart factory" is the goal, and the extensive adoption of IoT-applications like connected robotics, machine learning and big data analytics for digital simulation and prototyping, predictive maintenance and supply-chain optimization are the means to that end (Büchi et al., 2020, pp. 10–12). On the product level, the automotive aspirations are focused on the "connected car" that generates data from the physical world, receives updates and connects to other cars and devices (Paunov & Planes-Satorra, 2019, pp. 8–9). Processing these data streams, then, promises efficiency gains in production and competitive advantage on the product market, and controlling these data flows in the ever more complex layered architectures of industrial platforms becomes imperative.

Volkswagen, the largest vehicle manufacturer (in terms of vehicles sold), for example, embarked on an ambitious €7bn program to build a software subsidiary (Car.Software) with 5,000 staff tasked with increasing the ratio of proprietary software in all 12 VW-brands sixfold (*Financial Times*, 2020c). This amounts to nothing less than to relinquish a key premise of the "asset-light" business model (as well as the erstwhile obsession with "lean production") for the sake of increasing control over data-streams and expanding in-house competencies in big data analytics. In a similar move, Volkswagen relegated the role of Siemens Mindsphere in developing a digital production platform (integrating the entire VW supply chain with over 1,500 suppliers in more than 30,000 locations) to a mere operative part that deprives Siemens of any strategic control over the platform (Butollo, 2019, pp. 13–14; Guggenberger et al., 2020). These maneuvers of Volkswagen exemplify a key feature of the platform economy to which Kenney, Zysman and Bearson (2020, p. 12) persistently allude to: platform architectures are built in a strikingly hierarchical fashion by those who control the nexus of relationships and data streams (Riasanow et al., 2020, pp. 9–10).

Agriculture, in comparison, proceeds along a flatter vector of digitalization than the automotive industry since the processes and routines of farming, at least in the segment of small and medium-sized operations, is still shaped by experience-knowledge and a traditional reluctance

8. To demonstrate the gravity of changes we are faced with in an unmistakable fashion, debates of the Internet of Things are routinely framed in a "rhetoric of rupture" (Fleming & O'Carrell, 2012) that proclaims nothing less than the "Fourth Industrial Revolution". Slightly more sober synonyms for the "Internet of Things" are, with varying geographies of adoption, "Industry 4.0" (coined first in Germany's industrial strategy plan), "Factory of the Future" (European Union) or "Industrial Internet" and "Advanced Manufacturing" (in the United States) (Büchi, Cugno, & Castagnoli, 2020; see also Butollo, 2019, pp. 1–3).

to adopt unproven technologies (Finger et al., 2020, p. 314). And yet, the prospects of significant gains in efficiency and efficacy (and the promise to proof Malthus wrong, once and for all) through the extensive adoption of IoT-tools and -infrastructures boosted the platformization of large-scale agriculture towards "precision farming" (Villa-Henriksen et al., 2020, p. 62). This agricultural version of an industrial Internet of Things, in fact, ushered in a new production paradigm that affords the treatment of a field as a *heterogenous* entity: site-specific sensing, sampling and management allows to address variabilities in yield potentials, topography, soil characteristics, nutrient demands as well as abiotic (e.g., weather) and biotic stressors (e.g., pest and weed infestations) (Finger et al., 2020, pp. 315–317).

The platformization of agriculture has produced complex architectures (Kenney, Serhan, & Trystram, 2020, pp. 14-16) that at least consist of a device layer (such as farming equipment, irrigation systems and drones), a network layer (that affords the socio-technical means for data capture, storage and transmission across all layers) and an application layer (for monitoring weather, soil and crop parameters, infestation and pesticide dosage, and machinery) (Alreshedi, 2019, pp. 99–100). The interconnectivity between these layers furnishes agricultural internets of things that afford — "seamless" is the magic term here — flows of data (Villa-Henriksen et al., 2020, pp. 63–64). And these data flows are massive: the leading provider in the device layer, John Deere, gathers 5–15 million data points *per second* from over 130,000 connected devices around the world (Kantor & van der Schaaf, 2019, p. 3).

6.3 Polanyi on the Farmland 4.0: Digital Enclosure and Double Movement?

By turning towards an emblematic piece of machinery at the device layer, John Deere's combine harvester, a dynamic of corporate enclosure und civic protest becomes visible that, in fact, resonates with Polanyi's commodification and double movement dialectics. John Deere's combine harvesters, those "factories producing both data *and* crops in increasingly exquisite detail" (Miles, 2019, p. 8), are equipped with spectroscopic sensors that monitor in real-time quality traits such as starch, moisture, protein or fiber (Finger et al., 2020, pp. 315–317); and the smart camera system of the "See and Spray" application is able to distinguish healthy and unhealthy crops as the combine passes through the field. These data are transmitted in real time to the cloud, merged and combined with data from other data sources, analyzed and transformed into "prescription maps" that are transmitted, frequently bypassing the farmer, directly to the combine — down to the individual nozzle of the spraying system (Kenney, Serhan, & Trystram, 2020, p. 22). While traditionally decisions about the dosage of pesticides and herbicides have been made on a field-by-field basis, this system calibrates dosage to the sub-field level of individual *plants* (Miles, 2019): precision farming indeed.

The agricultural Internet of Things, without doubt, offers potentials to benefit individual farmers by significantly increasing the efficiency in the deployment of inputs and enhancing the quantity and quality of the output. Moreover, by increasing the accuracy in the deployment of inputs to the sub-field level, the environment is expected to benefit through reduced pollution and greenhouse gas emission, for example (Alreshidi, 2019; Finger et al., 2020, pp. 314–315). What appears less equivocal, however, are the benefits of all the data streams for the key orchestrator in the device layer who, rather than a single (yet complex) piece of machinery, provides "roving, metal algorithms" (Miles, 2019, p. 8).

Although parts of the data stream can be leveraged by the individual farmer to optimize operations, John Deere collects data at a level of granularity that afford ever wider control over the agricultural Internet of Things and, in Polanyian terms, result in an extensive enclosure of

data.[9] Through proprietary software, for example, John Deere is producing "field maps" that, for the US alone, comprise 50bn data points about field conditions and topography (Kantor & van der Schaaf, 2019, p. 3), and that can be portioned into field-specific prescriptions profitably offered back to farmers (who, by the way, harvested these data in the first place). Moreover, "predictive maintenance" applications trigger machinery to be summoned to corporate service inspections — and maintenance and repair are six times more profitable than sales of original equipment (Waldman & Mulvany, 2020).

The datafication of the device layer in the agricultural Internet of Things, in general, has fundamentally altered the relation between machines and farmers (Kenney, Serhan & Trystram, 2020, p. 22): Since the software running the equipment is subject to IP protections, the notion of "ownership" of equipment is substantially hollowed out. Farmers, instead, rather "license" critical inputs and have to share critical data for free in order to leverage the benefits that the precision equipment providers propagate (Miles, 2019, p. 7). One implication of this licensing relation between farmer and equipment provider, however, sparked fierce resistance: the debarment from repair and modification.

Farmers are precluded from changing engine settings, retrofitting old equipment with new features and modifying accessory components; they are even precluded from re-setting immobilizer systems (comparable to re-starting your laptop after a program crashed) (Wiens & Chamberlain, 2018). The protest against this debarment from truly appropriating machines (that cost up to $800,000), though, has not been articulated by the rarefied circles of techno-libertarians at the US west coast claiming digital rights. Rather, it originated from grass-root farmer initiatives in Nebraska, right in the Farm Belt of the US, who oppose IP barriers that undermine the agrarian ethos of resilience and self-reliance (Waldman & Mulvany, 2020).

Their fight for the "right to repair" (agricultural equipment) has spread to over twenty US states and eventually forced John Deere and other providers in the device layer of platforms to some concessions, like access to service manuals, product guides, and on-board diagnostics (Wiens & Chamberlain, 2018). Most recently the campaigns of the farmers has gained increasing momentum within a broader movement for the "right to repair" that extend to automobiles, smartphones, refrigerators and even hospital ventilators (a most crucial element of the device layer in the fight against the COVID-19 pandemic) (*The New York Times*, 2020c).

And through this virtual excursion that took off in the England of the beginning Industrial Age and ends in the farmlands of Nebraska, we have come full circle. Although this farmer's movement from Nebraska can hardly compare with the Speenhamland legislation Polanyi was extensively referring to, they qualify, in fact, as double movement in a Polanyian (1944/2001, p. 156) sense: "if market economy was a threat to the human and natural components of the social fabric [...] what else would one expect than an urge on the part of a great variety of people to press for some sort of protection?"

9. The spectrum of data gathered from combines include "production data" (i.e. field task details; area worked; route travelled; crop harvested and yield data; agronomic inputs applied), "machine data" (machine health indicators, settings and readings; machine hours or life; machine location; diagnostic codes, software and firmware versions; machine attachments, implements or headers) and "administrative data" (data sharing permissions; users linked to the account; machines, devices, and licenses linked to the account; number of acres and size of files; information about account utilization) (John Deere, 2020).

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