From automobile capitalism to platform capitalism: Toyotism as a prehistory of digital platforms

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Introduction

Imagine a familiar scene: a ride-seeker takes out their smartphone, opens the Uber app, and orders a ride. A few minutes later, an Uber driver picks up a passenger in a Toyota Prius, driving them to their destination. Guided by a data-driven app and set of algorithms that map the optimal route, manage the driver’s performance, and extract data about the destination, Uber is the iconic image of the disruptive, asset-light tech firm driven by digital intermediary technologies and multiple rounds of venture capital financing that is the model of platform capitalism today (Srnicek, 2016). Uber and companies like it have become the face of ‘platforms’ today and their controversial social impacts. Yet what we neglect in this scenario is not the driver—increasingly acknowledged as an employee deserving of benefits with the company described as a ‘platform labour intermediary’ (Doorn, 2017)—but rather the manufactured object of the automobile itself, the Toyata Prius. Built using lean manufacturing methods, just-in-time production, consumer data collection that feeds back into production, and variation combined with standardization, this car is the overlooked base of this platform economy and its organizational logics, literally and historically speaking.

The car is, and remains, the star of the platform economy. It is the oft-forgotten predecessor of the digital platform in its industrial and theoretical manifestations. As smartphone makers seek to get into electric vehicle production—including Apple supplier Foxconn—the automobile lineage of platform capitalism demands our attention. Drawing attention to this automobile lineage of the platform economy allows us to address two often unspoken claims made in recent literature on the platform: (1) that the platform is essentially a new technological and organizational form; and (2) that the platform is essentially digital in nature (ex.: Andreessen, 2007; Bogost & Montfort, 2009; Davis, 2016; Kenney & Zysman, 2016; Srnicek,
2016). To rephrase these claims as research questions, we should ask: (a) is the platform essentially new, and therefore productive of new organizational forms?; (b) is the platform essentially digital?; and (c) if the answer to both is “no” then what do organization studies, technology studies, and media studies miss by treating platforms as both new and essentially digital? In response to this special issue on the intimate relationship between organization and technology, this article traces the automobile lineage of the platform with a primary aim of forestalling assumptions of immediate organizational change corresponding to the rise of purportedly new technological forms like the platform; and with a secondary aim of prompting a deeper consideration of the non-deterministic relation of discursive and industrial practices to technologies and organizational forms.

Media studies scholars have noted the danger of taking platforms at face value. As Hoof and Boell caution, “‘platform’ has to be seen as an already value-laden description fostering certain managerial and economic interests’ (2019, p. 246). If skepticism about YouTube’s claims to being a platform, for example, means we should regulate it like a media company or television broadcaster (Napoli & Caplan, 2017), what are the consequences of arguing that platform capitalism is much more like automobile capitalism than we care to recognize? Following an exposition of the literature on platforms (including attention to platform capitalism and platform organization), and an explanation of research results that show the automobile industry and theories around it are the basis for current digital platform theories, the discussion section will consider the consequences of taking this automobile lineage of platform capitalism seriously.

**From Platforms to Platform Capitalism**
Platform has become one of the dominant media concepts, organizational paradigms, and corporate bywords of our era. The imperialistic advance of the term in claiming increasingly large swaths of industry, culture, and life around the world points to the terminological porosity of platform as term. In digital cultures analysis, network as a keyword was pushed aside by platform around 2016, according to media theorist Geert Lovink (Lovink & Apprich, 2017, p. xiv), the very same year Organization Studies had a special issue examining ‘The Transformative Power of Network Dynamics’ and ‘the network form of organization.’ As the editors of the special issue argue, the network as concept and analytic had a profound impact on organization studies since the 1980s. Given current trends, platform will likely occupy a similar role to network in years to come. A thorough consideration of the term is hence in order.

Thus far the field of organization studies has treated the polyvalent term platform as self-evident—notwithstanding important exceptions (Alaimo & Kallinikos, 2020; Gawer & Phillips, 2013)—and has not accounted for its longer history within organization studies itself. As Alaimo and Kallinikos (2020, p. 19) point out, ‘platforms remain badly understood as organizations,’ and the field could benefit from some of the skepticism the term receives in media and technology studies. Media studies (notwithstanding Nakamura, 2014; Qiu, Gregg, & Crawford, 2014), on the other hand, tends to treat platforms as uniquely digital and could equally benefit from an organization studies approach that accounts for the analogue history of platforms and the continuities in organizational forms and managerial practices which this article highlights.

While sympathetic to claims that media technologies impact organizational forms—such that ‘[c]ontemporary forms of organizing, such as virtual teams, just-in-time, or crowd sourcing are virtually impossible without ICT, underlining that media technology forms the very epistemology of communication’ (Hoof & Boell, 2019, p. 637) or Alaimo and Kallinikos’s
provocative (and, as they acknowledge, hyperbolic) claim the ‘the technology is the organization’ (2020, p. 18)–this article urges caution in assuming one-to-one correspondences between technology and organization. For instance: just-in-time production and the teams model arose from Toyota’s managerial innovations rather than media-technological ones (Liu, 2004). True, these innovations spawned media forms, such as the simple paper *kanban* card that supported just-in-time production (Andrijasevic, Chen, Gregg, & Steinberg, 2021). But rather than ICTs and digital platforms we should refocus our gaze on the automobile and its assembly line. Doing so makes evident that organizational practices bleed across technological shifts; and technological shifts don’t necessarily prompt change in organizational practices. The analogue, automobile lineage of the digital platform brings these continuities to light.

**Two Models of the Platform Concept**

Tracing this longer lineage of the platform requires a robust understanding of the term. The platform concept can be broadly parsed into two main variants: the layered *stack* model; and the horizontal *intermediary* model.

The stack refers to the layered model of the platform, often associated with computing (Bratton, 2016). Gillespie (2010) and others have traced this to the architectural definition of the platform as something upon which one stands. The usage is as present in media studies as it is in organization studies; the term refers to hardware such as the IBM 360 or the Intel chip as platform (Bresnahan & Greenstein, 1999; Gawer & Cusumano, 2002), to software like Java, to websites like Wikipedia (Aaltonen & Lanzara, 2015), social media sites like YouTube, Facebook or Twitter (Beverungen, Böhm, & Land, 2015; Gillespie, 2010), or music services like Last.fm.
(Alaimo & Kallinikos, 2020). In computing one layer is built upon another; in social media one posts something *on* the platforms in question.

One finds this stack model within many definitions of the platform. Michael Cusumano, a crucial figure in this automobile lineage of platforms, refers to this as the ‘product platform’:

The term ‘platform’ first came into wide usage in the management field as a word meaning foundation of components around which an organization creates a related but different set of products (or services). Toyota’s Corolla sedan, Celica sports car, Matrix hatchback, and Rav-4 sports utility vehicle are different products built in separate projects. But they share the same underbody as well as other essential components such as the engine. (Cusumano, 2010, p. 23)

In their overview of platform literature in business studies, Negoro and Ajiro refer to this model as a ‘core technology that is common to many digital products, such as display technology, the chassis in cars, printed circuits in AV equipment, etc’ (2012, p. 5). This definition aligns with a similar one by Gawer and Phillips, wherein the platform is ‘a core technological building block upon which organizations build complementary technologies, products or technologies’ (2013, p. 1063). Bratton (2016, p. xviii), for his part, describes the stack as a ‘modular and interdependent vertical order’ and ‘a kind of platform that also happens to be structured through vertical interoperable layers’ (Bratton, 2016, p. 52). In what follows I take the stack as one of the earliest industrial models of the platform, particularly in its automotive form.

As Cusumano suggests above, one of the crucial referents of the stack model of the platform is in fact the automobile chassis, known as the platform. The use of a base platform for multiple car models is a practice that conjoins base-level standardization with maximal second-level variation (De Vaujany, Leclercq-Vandelannoitte, & Holt, 2019). Baldwin and Clark’s
important work on modularity in the computer industry similarly traces these principles to automobile manufacture. Hence while the term stack may be most associated with computing, I resituate this usage in relationship to the automobile.

The second variant on the platform concept is the intermediary model. Unlike the layered model, this is a horizontal model of the platform as mediatory device enabling third party transactions to take place. The credit card is one of its models (Rochet & Tirole, 2003), and AirBnB and Uber are extensions of this model, operating as intermediaries between room hosts and renters, or drivers and riders, creating multisided markets (Parker & Van Alstyne, 2005).

Most economics literature on platforms stresses their function in bringing together two or more market ‘sides’ to allow for transactions to take place—via a credit card or the Uber app. The second usage overlaps with what Cusumano (2010, p. 23–24) calls an ‘industry platform,’ which depends on complementors and network effects to give the service its value—a computer being of relatively little value without the applications that run on it and the users relying on such applications.

**Platform Capitalism**

These two senses of the platform are the basis for theorizations of the platform economy and platform capitalism. In Nick Srnicek’s formulation, platform capitalism emerges after the multiple crises of capitalism, from secular stagnation to the financial crisis of 2008. The prominence of digital platform companies on the stock market comes as capital seeks high-growth investments; their prominence as an industry comes as their shift to data collection ‘jumpstart[s] a major shift in capitalism’ (Srnicek, 2016, p. 41). Platforms are intermediaries that facilitate multisided markets: ‘Essentially, [platforms] are a newly predominant type of business
model premised upon bringing different groups together’ (Srnicek 2017, p. 254). Proposed as a replacement for the competing terms ‘gig economy’ or ‘fourth industrial revolution,’ platform capitalism is a manner of describing ‘the effects of digital technology on capitalism’ (Srnicek 2016, p. 3).

Used in parallel to platform capitalism, the term platform economy denotes an era where American or Chinese platform-owning technology companies dominate the stock market in valuation; where data-gathering intermediaries are dominant the world round; where digitally mediated transactions transform economy, society, and culture (Chen, 2020; Kenney & Zysman, 2016; Pasquale, 2016; Steinberg, 2019; Van Dijck, Poell, & De Waal, 2018). The platform relies on a ‘new business model, capable of extracting and controlling immense amounts of data’ (Srnicek 2016, p. 6), resulting in a tendency towards monopolistic or oligopolistic firms, and leading some to term this ‘surveillance capitalism’ (Zuboff, 2019).

The now-pervasive keyword ‘platform’ has hence been accompanied since the mid-2010s by a periodizing claim: we live under a new regime alternatively called platform capitalism or the platform economy. Like Fordism or post-Fordism (Aglietta, 2000; Gramsci, 1971), platform capitalism is presented as an epochal shift; a transformative moment in modes of production, cultural forms, and organizational logics that have a corresponding form of labor: precarious work and the gig economy (Fleming, 2017; Scholtz, 2017). Scholars of India and China have pushed back on these epochal claims, rightly pointing out that platform capitalism is far from uniform; that ‘petty capitalism’ and ‘small-scale and family-based flexible regimes of production’ are the norm in China with Alibaba (Zhang, 2020); and the bazaar and the emporium are the real models of the platform marketplaces at work today in India (Athique, 2019), recalling earlier discussions of ‘bazaar governance’ (Demil & Lecocq, 2006). Nonetheless, the
epochal and geographically totalizing iterations of the platform capitalism concept remain
dominant.

These epochal claims have also impacted organization studies. Some have claimed the
platform represents ‘a new organisational form based on a relationship between the platform and
the ecosystem of firms dependent on the platform and users who interact and transact through it’
(Kenney & Zysman, 2020, p. 55); an alternative to the corporation which is perhaps ‘less
inevitable than we thought’ (Davis 2016, p. 134). Davis has been a particularly vocal advocate
for thinking of the platform as a replacement for the corporation, following upon ‘a regime shift
in the costs of organizing’ (2016, p. 129). Others likewise suggest that a shift from a ‘pipelines to
platforms’ requires new corporate strategy (Van Alstyne, Parker, & Choudary, 2016, p. 57).
Epochal claims about the platform economy subtend calls for radical shifts in organizational
strategy—out with the old, in with the new.

Theoretical Framework

This article takes a different approach, elucidating the automotive lineage of platforms, with an
emphasis on continuities rather than discontinuities, betting on the usefulness of established tools
of analysis and the value of historical consciousness. In this regard, platform capitalism may best
be described as automobile platform capitalism: as a set of production practices, labor-
management techniques, and data accumulation strategies optimized for the ‘production and self-
expansion of capital’ (Wood, 2002, p. 3) that grew out of the auto industry, particularly in its
Toyotist form. Indeed, in Toyota’s post-1950s management innovations we find many of the
elements central to definitions of platform capitalism, including:

- data gathering and mobilization
- the modeling of firms as intermediaries or hubs between production sites
• the reliance on temp workers
• the crucial role of logistics
• just-in-time models of production and delivery
• platform models of standardization plus variation
• the outsourcing of risks and warehousing costs to subsidiary or supplier firms

The auto industry and Toyota’s contributions to it are hence the missing pieces of the history of the platform economy (as industry) and the platform concept (as theory) that informs it.

Cusumano’s work points to this connection between the auto industry and digital platforms. Yet Cusumano limits this connection to the stack model of the platform, whereas this article demonstrates that both stack and intermediary models of the platform have their roots in Toyotist automobile production. Toyotism is the unseen industrial and epistemological background against which the platform economy plays out.2

Pointing to this longer lineage allows us to temper some of the grander claims about novelty over continuity at play today in both critical and celebratory discussions of platform capitalism, and thus the consequences for organization being drawn from them. In doing so I draw on crucial contributions to a literature of caution in organizational studies that mitigate against the frequent adoption of new, epochal paradigms (Du Gay, 2003) and argue for the need to attend to the historical dimension of organization research (Booth & Rowlinson, 2006). As Du Gay writes:

What is striking about much contemporary organizational theorizing—whether critical or more commercially purposeful—is the epochalist terms in which it is framed. By ‘epochalist’ I refer to the use of a periodizing schema in which a logic of dichotomization establishes the available terms of debate in advance, either for or against. (2003, p. 664)

Du Gay’s words of caution are as helpful amidst current platform epochalism as they were in 2003. There are crucial continuities between automobile manufacture and digital intermediaries.
such as Uber (Fleming, 2017; Rosenblat & Stark, 2016; Scholz, 2017), or the logistics-dependent Amazon for that matter. Here I use Uber as a shorthand both for the platform economy and its automobile centrism (including Didi Chuxing, Waymo, Tesla, and other auto-centric platforms; but equally so other non-auto platform giants like Google or Amazon). Under the hood, most platform companies (with the possible exception of social media) are ultimately data-dependent logistics firms, in the mold of Toyota.

In stressing the continuities between the automobile industry and the platform economy, this article also builds on John Urry’s visionary work on ‘automobility’, reaffirming his emphasis that the car is ‘the quintessential manufactured object’ that integrated different sectors of twentieth century capitalism (Urry, 2004, p. 25–26)–and extending it into the twenty-first century. Urry foregrounds the determining role of the ‘system’ of automobility to the design of roads; to steel production; to the oil economy; and suburban life. Dennis and Urry also predict the increasing interdependence of the automobile and information technologies (2009; Urry, 2004). Building on this insight I detail not the extension of digital platforms into the car as entertainment systems (i.e. platforms in cars), but how the principles of Toyotist auto production inhabit the platform industry in its entirety (platforms as cars).³

Along with tracing the longer trajectory of industry practices, the lineage from the car to the platform traced here further aims to denaturalize assumed equivalences between platforms and the digital, finding something else at the platform’s beginnings: a car not a computer. In the context of this special issue, the aim is to show that a crucial lineage of the platform has been overlooked. Following Beyes, Conrad, and Martin’s prompt to think ‘media through organization and organization through media’ (2019, p. viii), this article demonstrates that automobile manufacture and its organization are the basis for the digital media artefacts we call platforms.
Before the car’s traces are fully erased in its subsumption by the digital, we must recover the automobile roots of the platform—much as Cornelia Vismann narrates the history of material files on the cusp of their replacement by icons of folders on desktop computers. Vismann argues that a ‘history of files therefore also contains a prehistory of the computer’ (2008, p. 164). So too, the history of Toyotism contains the forgotten prehistory of platform capitalism. Recovering this account allows us to better account for the return to automobility within platform enterprises: Uber and Didi, of course, but Waymo, Tesla, and Toyota as well.

To substantiate this lineage, below I trace the two models of the platform—stack and intermediary—to Toyotist transformations of the auto industry, illustrating the industrial continuities between the automobile industry and the information technology sector.

Subsequently, I show how academic discussions of platforms have taken their start in writing on the auto industry. Platforms are doubly determined by the auto sector, then: by their data-centric industry manufacturing practices, and by automobile theory’s formative influence on digital platform theory.

**Toyotism in Practice: Industry**

*The Stack Model*

The automobile industry is one of the first sites where we see an overt deployment of the stack as an industrial model of platform development: building multiple models of cars from a single base or standard; a ‘number of different body styles spun off a base model (or ‘platform,’ in car talk)’ (Womack, Jones, & Roos 1990, p. 112). The look of a given car is determined by the body stacked on top of the platform. This underbody includes the chassis, the steering mechanism, and sometimes the engine, common to different car models, sometimes belonging to
entirely distinct brands. For instance, since the early 2000s, the Volkswagen Golf hatchback and Jetta sedan, the Audi A3 sedan and Q3 SUV, and the Skoda Octavia sedan are a few of the cars that all share the same underbody or platform – different models, price points, and brands all housed on top of the same platform (Mike, Mats, & Javier, 2007, p.12).

This system of platform standardization with model-level variation was pioneered by Ford in the 1920s, and further developed by General Motors (GM), which aimed for a full product and model range from inexpensive to expensive; a practice optimized by Toyota in the 1960s on (Mike et al., 2007; Ohno, 1988, p. 113; Womack et al., 1990, p. 34). Toyota develops a flexible production system, responsive to market demands and offering the greatest product variety combined with base-level standardization—all the while avoiding the over-accumulation of parts and overproduction of vehicles that plagued both Ford and GM (Womack et al., p. 64). Today, the automobile industry as a whole operates according to a model of platform thinking (Mike et al. 2007, 4) – including almost all mass production car manufacturers, from Toyota to VW, Nissan, Fiat and GM (Whitford & Zirpoli, 2016).

The term platform was first used in the automobile sector in the early 1970s to describe this manufacturing practice. Prior to this, the base-level standard was referred to as ‘chassis,’ ‘model,’ ‘base model,’ ‘base-shell,’ or ‘body shell’. The popularization of the term platform in the automotive sector seems to date to the late 1970s, with its usage increasing by around 1978–79, becoming the go-to term by the 1980s (ex: Flint & Tomarkin, 1979, p. 51). A 1980 report to the U.S. government describes the ‘now almost universal acceptance of the platform strategy (one basic car design that can be stretched or shortened without complete retooling of all phases of the production process) to cut production costs’ (“World Auto Trade,” 1980, p. 234). By this
point the term is established in public discourse – notably prior to its widespread use in computing.

A thorough examination of the Factiva global news and magazine database, parsed semantically, supports this point, showing that the use of the term platform in relation to computing only begins in the mid-1980s, slightly after its usage in the auto industry. Some track the computer industry use of the term platform to the mid-1990s, led first by Microsoft and then Netscape (Plantin et al., 2018, p. 296). Others suggest that it was in the ‘late 1980s and 1990s’ that the ‘computer industry underwent a dramatic shift from a traditional supply chain logic dominated by computer assemblers to a new platform logic’ (Gawer & Philipps 2013, p. 1036). Yet the computer usage of platform only overtakes the automobile industry over the course of the 1990s as the industries trade places in economic prominence and analytic focus. Contrary to assumptions of a computer-industry origin of the concept, often back-projecting it to decades earlier (for instance, calling the IBM 360 a platform [Bresnahan & Greenstein, 1999]), we find it in the auto sector first, expanding from there to the information technology sector. The stack platform concept hence emerges from the automobile industry and its analysis, only later migrating to computing.

**The Intermediary Model**

If the stack model for the platform is traceable to developments first undertaken at Ford and GM, Toyota is where we see the development of data-intensive production and the platform as intermediary. Toyotist automobile assembly and manufacture, known as the Toyota Production System (TPS), was based on ‘just-in-time’ (JIT) principles developed in 1948 and expanded in the mid-1950s (Cusumano, 1985, p. 278-9), a model of ‘lean manufacture’, and
communicational porosity during the production process (Womack et al., 1990). Abandoning the Fordist ‘just-in-case’ logic of overproduction (Sayer, 1986, p. 43), Toyotist just-in-time production began building the automobile upon receiving the consumer’s order, with data gathered at multiple points in the production process. As noted above, Toyotism includes the following elements:

- just-in-time production processes supported by “kanban” cards and other feedback mechanisms throughout the production process
- worker initiatives to suggest adaptations to the production line
- continuous improvement to the production process (known as “kaizen”)
- rigorous forms of quality control
- tight informational loops between automobile dealers, salespeople, and the factories and component producers themselves, making for a highly adaptive, data-reliant production process (Cusumano, 1985; Dohse et al., 1985; Hines et al., 2004; Martin Kenney & Florida, 1993; Tsutsui, 2001).

During its managerial heyday in the 1980s and 1990s, the TPS was variously described in manuals, management literature, and the popular press as TPS, JIT, lean manufacturing, or zero inventory (Andrijasevic et al., 2021).

Ohno Taiichi (1988, p. 15), the architect of the TPS, describes just-in-time as a system based around ‘the absolute elimination of waste’. According to Ohno, ‘Just-in-time means that, in a flow process, the right parts needed in assembly reach the assembly line at the time they are needed and only in the amount needed. A company establishing this flow throughout can approach zero inventory’ (Ohno 1988, p. 15). Only the minimum necessary number of cars are produced, using parts arriving just-in-time for their use on the production line, thereby eliminating the need for ‘wasteful’ storage space on the premises. The main tool used in the elimination of waste and the operationalization of just-in-time was the kanban system. The kanban is a paper sheet encased in a translucent vinyl plastic cover that allowed workers to order additional parts as they run low. As the assembly line moves in one direction, kanban move in
the opposite direction, informing internal and external suppliers what parts are needed and when, building a real-time data set about supply levels (Monden 1994, p. 9). The kanban system also allowed Toyota to position itself as an intermediary between multiple parts suppliers and the final consumer during the sequence of production.

The essential element of the Toyota Production System was hence the once low-tech informational system supported by this mobile piece of paper, recalling what Bruno Latour in a different context referred to as an ‘immutable mobile’ (Latour, 1986, p. 7); a small, paper-based object that allows control to be exercised at a distance, in this case over the company’s suppliers. As veteran TPS analyst Yasuhiro Monden puts it, ‘The kanban system is an information system that harmoniously controls the production of the necessary products in the necessary quantities at the necessary time in every process of a factory and also among companies’ (1994, 15). While Toyota experimented from the 1950s on with computers to coordinate production, into the 1980s Ohno and his managers found it ‘unnecessary to buy costly software and computer systems when the paper kanban provided accurate information, almost instantaneously, on changes in production capacity, operating rates, and manpower’ (Cusumano, 1985, p. 298). The simple kanban represents an organizational system and technology of data collection and control that coordinated the massive, geographically sprawling Toyota enterprise, including its multi-tier layers of supplier firms. The system positioned Toyota as an intermediary between stages within production, and, ultimately, consumption in a manner that anticipates contemporary platforms. In this regard that we can say Toyota anticipates the intermediary model of the platform. Like Uber today, Toyota operated as a coordinating intermediary: it gathered and mobilized data in car production, it delegated the production of parts to multiple suppliers, and it functioned as an intermediary between end consumers and suppliers.
This reliance on a large number of suppliers is another key element of the TPS. Toyota subsidiaries and subcontractors produced up to 70% of the final material of the automobile—compared to 30-50% within US suppliers (Kenney & Florida, 1993, p. 46). Toyota plants operate as central hubs around which a series of subsidiary companies and subcontractors are arrayed (Kaneko & Nojiri, 2008). These are figured in a core-periphery model, featuring some ten tiers of suppliers around a central production hub. Whereas core companies ensure guaranteed employment, the contractors—contrary to earlier depictions of Japanese lifelong employment (Ouchi, 1980, p. 132)—depend on expendable, precarious laborers, often women or temporary foreign workers (Yamada, 2010), anticipating the gig economy of today (a longer history Fleming (2017) delineates via human capital theory in another context). These massive, just-in-time, distributed production complexes function as the ‘ultrastructure’ of the Japanese economy (Kennedy and Florida 1993, p. 46). (Fiat has a similar reliance on outsourcing, as noted by Whitford and Zirpoli (2016, 1231), though space does not allow for more extensive comparisons between the two companies.)

In the words of a popular trade book, Toyota CEO ‘Ohno’s idea was simply to convert a vast group of suppliers and parts plants into one large machine’ (Womack et al., 1990, p. 61). At first this information system operated only in the sphere of production; later it tied moments of purchase back to the sphere of production. In so doing Toyota elaborated ‘a sales network very similar to the Toyota supplier group’ (Womack et al., 1990, p. 66). A network of vendors, who traveled around to their customers’ homes to canvass their needs, reported back their preferences and auto orders to Toyota’s head office. Consumers’ orders for new cars mirrored kanban cards, this time moving forward to the production facilities. In Toyota’s built-to-order system the vendor became the ‘first step in the kanban system, sending orders for presold cars to the factory
for delivery to specific customers in two to three weeks’ (Womack et al. 1990, p. 66). Even when
not selling a car, vendors making the rounds to customer homes in Japan helped accumulate data
about each customer’s family status, car purchase history, and preferences, ensuring that
distribution [became] a fully integrated part of the entire production system’ (Womack et. al.
1990, p. 194). The TPS was hence one giant informational network, first conceived via the
movement of the paper kanban, and later executed by networked computer systems like those
used by airline reservation systems to regulate orders to the head company and then downstream
to suppliers (Kaneko & Nojiri, 2008, p. 163; Aoki 1990, p. 5).

Within this system, Toyota occupied the place of a data-gathering intermediary shuttling
information about demand throughout the entire production network, from vendors and
dealerships to secondary and tertiary suppliers. Again, this hub-like function of the Toyota
factory is structurally akin to the intermediary function of platforms within a multisided market.
Toyota as production hub and coordinator hence anticipates the data-intensive, intermediary-
style operations of the platform enterprise as a horizontally organized firm that sees the
proliferation of data points: salespeople, consumers, firms, subcontractors, and workers.
Toyota’s role in managing production anticipates the model of digital intermediaries like
Facebook (Beverungen et al., 2015) or Amazon in their coordination of buyers and sellers. Like
the digital platforms that would come later, the boundaries between inside and outside, and direct
employees and indirect laborers blurred within Toyota’s production system as it connected
multiple agents whom it mediated. In its hub-like coordination of multisided markets, Toyotism
is a crucial organizational antecedent of platform intermediaries today. Figure 1 maps these
correspondences.
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<td>Automobile industry built around stack (started with Ford; further developed by GM and then Toyota)</td>
<td>Stack model of platform for computers or social media sites</td>
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<tr>
<td>Term <em>platform</em> used in relation to base or chassis as of late 1970s</td>
<td>Term <em>platform</em> used in relation to computers in 1990s, and social media sites as well as digital intermediaries as of the 2000s</td>
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Figure 1: Parallels between the Toyota Production System and platform capitalism.

**From Toyotism to Digital Platforms: Theory**

The above section charts the platform stack and intermediary models as they develop in the manufacturing practices of the automobile industry. In this section I focus attention on the history of popular and academic management writing about platforms, presuming the impact management writing has on industry practices (Gregg, 2018; Hoof, 2020; Liu, 2004). Here I trace the conceptual development of the stack and intermediary models of platforms from the automobile sector to information technology through the work of two figures: American
management scholar Michael Cusumano, and Japanese management scholar Kokuryō Jirō. Their work represents two crucial moments of transition from automobile to digital platforms.

**American Platform Theory**

The development of platform theory within American and Japanese management literature in the 1990s is deeply indebted to its initial location inside automobile industry analysis. One of several figures connecting the two is Michael Cusumano, a US-based academic trained at Harvard as an economic historian of Japan’s automobile industry, who subsequently taught within MIT’s Sloan School of Management. In the 1980s and 1990s he was associated with MIT’s International Motor Vehicle Program (IMVP), formally joining MIT in 1986. The IMVP was an influential program driven by American and international corporate and governmental efforts to grapple with changes the automobile industry was undergoing, and the Japanese ‘lean manufacturing’ challenge in particular (Womack et al., 1990, p. 2). Indeed ‘lean’ was itself coined by an IMVP researcher and popularized by *The Machine that Changed the World* (Holweg, 2007; Womack et al., 1990). The IMVP was established with automobile manufacturers’ funding to study the Japanese production system at a moment when it posed an existential threat to European and American automobile companies. It also served as a bridge, helping Japanese manufacturers Toyota and Nissan establish branch plants in the US and Europe. The IMVP was where much of the English language empirical and theoretical work on Toyotism first developed in the 1980s (Hines et al., 2004), and is a crucial site from which platform research emerges – first around automobiles, later around the computer industry, and today around the platform economy.
Cusumano’s work is foremost among this research group that started with automobile platforms before pivoting to digital platforms (Cusumano et al., 2019). Cusumano’s earliest work was his 1985 book, *The Japanese automobile industry: Technology and management at Nissan and Toyota*. Based on his PhD dissertation, this extensively researched tome ‘attempts to rectify a major oversight – the absence of a comprehensive history of Nissan, Toyota, and the industry they have dominated for five decades in Japan’ (Cusumano, 1985, p. xix). This book was released amidst a flurry of studies on the Japanese automobile industry, including more popular overviews such as David Halberstam’s *The Reckoning* (1986), Richard Schonberger’s *Japanese manufacturing techniques* (1982) and Robert Hall’s *Zero Inventories* (1983). Substantial research in Japanese on Toyotism already existed, and was being translated into English by the 1980s (Holweg 2007, p. 431). Yet Cusumano’s book stands out for its close attention to manufacturing processes and their histories—an approach adopted by IMVP researchers around this time.

By the late-1980s Cusumano had turned his attention to the software industries, first in Japan, and later in the US as well, publishing *Japan’s Software Factories* in 1991 (Cusumano, 1991) before shifting to the study of Microsoft (Cusumano & Selby, 1995) and then Netscape (Yoffie & Cusumano, 1998). At the same time, he continued his work on the automobile industry, extending his earlier work with attention to platforms in his co-authored book with his student and former Mazda employee Nobeoka Kentaro, *Thinking beyond lean* (Cusumano & Kentaro, 1998). This dual attention to the automotive and the digital is significant, and the former arguably informs his analysis of digital platforms.

As Cusumano was transitioning to an analysis of digital platforms, another group of scholars was extending the stack model of the platform from within automobile analysis to other
product families, forming the ‘product platform’ subgenre of analysis in the 1990s. Wheelwright and Clark (1992) are credited with the expansion of the term from the auto sector outward (Gawer, 2009, p. 46), and they draw on the automobile industry’s framing of the term as both a system of parts and a process of product design (Holweg, 2007, p. 424). Even as they expand the platform concept beyond the car, Wheelwright and Clark anchor their account of this expanded platform concept with reference to automobiles: ‘Honda’s 1990 Accord line is an example of a new platform in the auto industry: Honda introduced a number of manufacturing process and product changes but no fundamentally new technologies’ (Wheelwright & Clark, 1992, p. 73). They continue with a reference to computers before expanding to a wide range of products, including Tide detergent: ‘In the computer market, IBM’s PS/2 is a personal computer platform; in consumer products, Procter & Gamble’s Liquid Tide is the platform for a whole line of Tide brand products’ (1992, 73). The sequence from automobile to computer to cleaning products is indicative of the centrality of cars to platform theory. Wheelwright and Clark’s early foray into a generalized platform theory was followed by works by Meyer and Lehnerd, including their popular book, *The Power of Product Platforms* (1997). Product platform literature hence emerges from the automobile platform concept and leads to research around ‘modular product architectures and component reuse’ (Cusumano 2010, p. 32). As Suarez and Cusumano notes ‘The auto industry was probably one of the first to adopt a platform strategy’ (2009, p. 77-78). Platform theory until this point was informed by the stack model.

Building on the platform family concept but breaking both with its automobile origins and the presumption of adherence to a single family or brand, Cusumano introduces a version of the intermediary model in his influential book, cowritten with Annabelle Gawer, *Platform Leadership* (2002). *Platform Leadership* is one of the earliest management books about hardware
and software platforms in the early twenty-first century. The book builds on Cusumano’s mid-
1990s work on Microsoft and Netscape, as well as on Gawer’s dissertation research; Gawer has
since become one of the most important figures in platform management studies. Platform
Leadership differentiates the stack model of the product platform from a newer model of the
platform, what they variously call ‘technology platforms,’ or ‘industry platforms’ (Gawer &
Cusumano, 2002). In Cusumano’s later definition, technology platforms provide ‘a common
foundation or core technology that a firm can reuse in different product variations, similar to an
in-house product platform’ (2010, 32). The twist is that these reuses are assumed to be outside
the company; the company disaggregates the platform (base) from its ‘complements’ (external
software components or products that give the platform its value). This in turn requires ‘a
strategy to open their technology to complementors and create economic incentives (such as
licensing fees or financial subsidies) for other firms to join the same ‘ecosystem’ and adopt the
platform technology as their own’ (Cusumano 2010, p. 33). The distinction between Microsoft
and Apple during the 1980s is an obvious one in this context: Microsoft more successfully
supported other companies (‘complementors’) creating software for its Windows operating
system, which became the dominant OS (Gawer & Cusumano, 2002, p. 7). In this view
complementors become more important to the success of a product than the product itself.

This emphasis on external complementors is a crucial step towards the now-dominant
intermediary model of the platform. Understanding the technology platform as existing in a state
of codependency with a system of objects—objects that increase the value of the platform for both
the user and owner—signals a shift from a vertical platform stack model structure to the
horizontal platform intermediary model. As seen in this brief account of Cusumano’s work, the
horizontal intermediary model emerges out of initial research on automobile platforms,
extending into work on digital platforms. It also provides a conceptual articulation of the intermediary model we saw already in industry practice in the Toyota Production System.

**Japanese Platform Theory**

This intermediary concept of platform also develops several years earlier by way of a separate (and to Anglophone scholars relatively unknown) group of Japanese management thinkers in the early 1990s. Here the platform begins as a way to grapple with the digital shift and the potentials of internet-mediated commerce. Yet here too the automobile industry plays an important role to the development of this theory. In this the figure of Kokuryō Jirō is central. Kokuryō is a Harvard business school-trained Japanese management studies scholar who along with established management thinker Imai Ken’ichi developed some of the first theorizations of the platform as a mediation device for third party transactions (Negoro & Ajiro, 2012)–what would later become the mainstream of platform theory in the 2000s in the English speaking world, especially via the economics of multisided markets (Rochet & Tirole 2003). Kokuryō’s work sparked the development of Japanese intermediary platform theory, which in turn inflects the emergence of Japanese mobile internet systems such a ‘i-mode’ (as well as the iPhone and Android systems inspired by it), which are premised around the centrality of the mobile phone as interface and hub for the digital economy (Kodama, 2003; Natsuno, 2003; Steinberg, 2019). This precedes and yet has overlaps with French and American research on industry platforms and multisided platforms.

A crucial first intervention here was the special issue of the journal *InfoCom REVIEW* titled ‘Platform Business,’ which Imai and Kokuryō co-edited in 1994, followed by monographs by Kokuryō (1995) and Negoro and Kimura (1999), among others. The *InfoCom* special issue,
released amidst increasingly widespread use of proprietary information networks by companies like Toyota and 7-Eleven (Marutschke, 2011) and on the cusp of the widespread commercialization of the Internet in Japan in the mid-1990s, promised to account for what Imai describes as the ‘massive changes the Japanese industrial system is undergoing’ (Imai, 1994, p. 3). The aim was to examine ‘how the advances and innovations in information and communications technologies lead to changes in the mechanisms of transactions between companies, and how these in turn led to changes in company organization and industrial organization’ (Imai, 1994, p. 3). The framing here is familiar to us from Davis (2016), Alaimo and Kallinikos (2020), and others above: how new technologies lead to new organizational forms. For Imai, the focus on transactions opened up a new front in the study of business organizations, via the concept of the platform. Imai presents the special issue as a step towards mapping some of the transformations wrought by digital technologies on the structure of inter-company trading and the ‘keiretsu’ business model, with the aim of envisaging the ‘composition of the new industrial organization’ (1994, p. 3), with corporations modeled as transactional intermediaries.

Kokuryō would define the platform business as ‘one where the existence of a foundation or base provided by a private business allows anyone to supply goods and services to another party under a specific set of conditions, thereby invigorating transactions between third parties and building new businesses’ (1994, 4). He offers the following examples of such platforms:

Credit cards and other intermediaries of trust allow various businesses to be established and enable transactions between third parties to take place. Express delivery services, for instance, enable the creation of new transactional forms built around direct-from-the-farm deliveries, allowing the farm owner to establish a profitable business. Or, yet another
example of the meaning of platform business can be found in manner in which Microsoft, by providing what is a ‘de facto standard’ OS, in turn allows for the establishment of independent companies built around offering related products and services. (Kokuryō 1994, p. 4)

Each example Kokuryō provides is one in which a basic service or technology provides the ground from which other companies and businesses can spring into existence and mediate between third parties. In this sense he offers a synthesis of the two models of platforms we saw above: the stack model and the intermediary model.

Kokuryō explicitly articulates this as a shift from a vertical model of the industrial organization to a horizontal model of industrial organization (1994, p. 5). Proposed with an eye to the effects of networked technologies on industrial relations, the platform also promised a shift from vertical integration to horizontal intermediation as an industrial model; from conglomerate or keiretsu to intermediary firm. This conception of the platform as both layered material support and intermediary is a composite of product platforms and technology platforms—both stack and intermediary, giving a first theoretical articulation of the industrial developments by Toyota tracked in the previous section.

In this regard, Kokuryō and his collaborators’ attention to the automobile industry—industrial and automobile parts supplier Misumi was one of their case studies; the Aucnet used car auction another—as well as their more general concern with what Imai called ‘changes in company organization and industrial organization’ suggests further connections between the automobile industry and the reconceptualization of industrial forms they undertake in their special issue. I would further speculate that the conditions for this initial development of the intermediary platform model were the particular conjunction of the rise of information
technologies alongside the 1980s and 1990s hype around the intermediary industrial organization pioneered in the automobile industry, and by Toyota in particular. If this ‘platform business’ theory could emerge at this time, it was likely due to the prominence of the auto industry’s hub-like production practices in the first place. The auto industry offers the epistemological ground for the development of what would become digital platform theory.

To sum up, Cusumano’s research trajectory demonstrates how work on automobile platforms lays the ground for work on computing and digital platforms. Kokuryō’s platform business theory, including its deft marriage of stack with intermediary models of the platform, demonstrates how digital-first platform theory of the 1990s was itself still preoccupied with changes to one of the largest sectors of the Japanese economy: the automobile industry. Both scholars continue to be leading voices in the articulation of the digital platform economy in the US and Japan, with two examples being Cusumano’s co-authored *The Business of Platforms* (Cusumano, Yoffie, & Gawer, 2019) on the one hand, and Kokuryō’s co-edited (Japanese) volume *Platforms for Emergent Management* (Kokuryō & Platform Design Lab, 2011) on the other. Figure 2 summarizes these correspondences.

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Figure 2: Summary of the distinct trajectories of platform theory in the US and Japan.

Discussion

In the above sections this article outlines the industrial dependencies and theoretical continuities between the automobile sector and platform businesses. In doing so this article tracks changes in both industry practices and theoretical analysis, noting how the platform theory of Gawer, Srnicek and others is deeply dependent on developments in the automobile sector. In what follows I will highlight some crucial takeaways of this shift from a computing to an automobile lineage of platforms, particularly in light of this special issue’s interrogation of the relation between technology and organization.

First, this longer lineage of platform theory and practice this article traces back to the automobile industry, the crucial industry of the 20th century, paves the way for a revaluation of the history and periodization of the platform today. It rescues the automobile platform from its erasure by digital platforms and suggests we may have something to learn from an increased focus on manufacture as a site of analysis (Qiu et al., 2014). In particular, the crucial role of just-in-time in both Toyotism and platform capitalism (via ‘on demand’ services in the latter) suggests an occluded connection between the two that should be further investigated moving forward. This lineage allows us to be critical of the presentism of writing about platforms. It also reminds us of the need to be cautious of claims of novelty whether they be in relation to the
newness of new media (Chun, 2016) or to epochal paradigms in the study of organizations (du Gay, 2003).

Consequently, we should reappraise recent writings on platform capitalism such as Srnicek’s which, while very valuable in mapping the financial conditions for the rise of platforms and in creating platform typologies, tends to present the data-centrism and mediatory emphasis of the platform era as novel and Silicon Valley-centric. Platform capitalism should be considered an extension of Toyotism and automobile logics, rather than a complete break from these. To return to Vismann’s argument that a ‘history of files therefore also contains a prehistory of the computer’ (Vismann, 2008, p. 164), we must assert that the history of Toyotism contains the (or one) forgotten prehistory of platform capitalism. This becomes all the more clear when we observe how everything from firm organization (e.g. the lean organization) to software programming (e.g. Agile) to start-up philosophies (e.g. the ‘lean start-up’ [Ries, 2014]) revolve around ‘lean’ as a mantra.

Second, following from this, we should treat with some caution recent writing in organization studies that assumes the demise of the corporation results from the rise of digital platforms (Davis, 2016; Van Alstyne et al., 2016). The platform is less a technological object that results in the decline of the corporation than a managerial one that allows corporations to offer and distribute products and services by other means. It is true that new kinds of asset-light companies have emerged, whether Uber or Airbnb—‘intermediaries of trust’ as Kokuryō (1994, p. 4) would call them—in which the majority of their ‘employees’ are in fact contractors. On the other hand, platform companies like Google, Microsoft, or Amazon have built computing stacks, data warehouses, and logistics systems to support their hub-like intermediary operations, even as they too outsource large parts of their activities to contracted employees (Moreno, 2019). As
such these latter firms more closely resemble Toyota and their multiunit, multi-divisional enterprise form, may require a return to a consideration of the multidivisional form (M-form) of corporation that Chandler (1977) first analyzed in his treatment of, alongside DuPont, the automobile industry and GM in particular. In this regard Srnicek’s convergence thesis—‘the tendency for different platform companies to become increasingly similar as they encroach upon the same market and data areas’ (2016, p.107)—deserves attention. As Google, Microsoft, and Amazon (or Alibaba, Tencent, and JD.com) increasingly operate in the same fields they require multiple product divisions to support their activities, suggesting a continuation of the M-form organization. As platform firms become massive, monopolistic enterprises operating in multiple fields—from video streaming to consumer electronics to robotics to logistics, in the case of Amazon—returning to an earlier moment of corporate history (Chandler, 1977) and the attending critique of monopoly capital (Baran & Sweezy, 1968) may offer some critical tools for analysis.

Third, the attention to management theory’s impact on platform models suggest the importance of reading management theory as itself a site of industry modeling. Nigel Thrift notes that management discourse ‘increasingly… forms a background to how business is practiced’ (2005, p. 30). Management texts are productive of models used to grapple with the industrial changes at hand. They feed back into managers’ own activities within their firms. In particular, the managerial innovations initiated at Toyota and the ripple effect of lean principles spreading across industries suggests that, as Melissa Gregg has written, “Toyotism—not Fordism—is the crucial managerial revolution of our time” (personal communication, June 1, 2021; see also Andrijasevic et al., 2021). More attention should be paid to the rhetorics, concepts, and ideas produced in management theory, and Toyotism in particular, in its complex entanglements with organizational practice and media history (Hoof, 2020).
Doing so requires that we appreciate the complex, two-way relationship between platform theory and organizational practice. Attending to how one impacts the other allows us to see the more circuitous relationship between new technologies as they produce (or do not produce) new organizational forms. Equally important here is the gap between technologies and practices. Just-in-time production is achieved first by circulating pieces of low-tech paper before being integrated into the networked computers and manifesting in the cultural expectations of on-demand service that propel JIT today. This ultimately reaffirms Raymond Williams’ (2003) caution against presuming determinist relations between technology and culture—pushing back on McLuhan’s (1994) media determinism of the ‘medium is the message’ and serving as a preemptive rejoinder to Kittler’s subsequent assertion that ‘media determine our situation’ (1999, p. xxxix). Technologies are bound up with organization (Hoof & Boell, 2019), but, as the findings here illustrate, not deterministically so. Media do not simply organize; media themselves are organized by social institutions (Conrad, 2019). In this case platforms as media and technologies are informed by existing managerial practices. To Alaimo and Kallinikos’s pithy provocation that the ‘the technology is the organization’ (2020, p. 18) we might suggest, then, that organizations are collections of practices that inform and resist the adoption of technologies. This crucial gap between technology and organization is worth attending to.

Fourth, in recentering the automobile sector and the transpacific legacies of its study, this article reminds us of the complex geographies of the production of the platform concept. Displacing its usual association with Silicon Valley firms and showing how the platform as concept and practice is produced at a nexus between Japanese and US automobile industries and their analyses, this article has shown how theory itself is produced via transnational exchange. That this involves an exchange between the world’s two largest economies at the time of this
exchange in the 1980s and 1990s is not surprising. Yet even while Japan has maintained a certain economic hegemony, it has not always been accorded the relative discursive attention, particularly within platform studies. Here, then, this article proposes a certain reorientation of theoretical production (Salazkina, 2015; Steinberg & Zahlten, 2017) by situating platform theory itself as a coproduction between Japan and the US.

Finally, there is a political lesson to learn from refocusing on the car. The automobile industry was a site of intense worker contestation and mobilization in the 20th century (Parker & Slaughter, 1990). In the midst of labor organizing by Amazon and Uber workers, one pragmatic lesson to be drawn from this continuist lineage of automobile capitalism to platform capitalism is that while the solidarities created by co-working in an automobile plant might seem more difficult to recreate in a platform-mediated present, they are not insurmountable. Even amidst the setbacks of these efforts and the challenges of organizing in the face of these massive platforms, scholars have documented the efforts and successes of this mobilization in China, Europe, and North America; solidarities can and are being created among gig workers (Chen & Qiu, 2019; Chen & Sun, 2020; Doorn, 2020; Scholz, 2017). Mobilization for worker rights may be successful, and platforms may be sites of political organization, not simply resignation (Lovink, 2021).

**Conclusion**

This article has traced a lineage of the platform that redirects attention from the computer to the car. Developing the heuristic models of stack and intermediary forms of the platform as a means of giving definition to this otherwise slippery term, this article demonstrates the automobile lineage of platform capitalism. It also traces the gig economy to longer histories of
outsourcing and precarious labor in the automotive industry, and traces data-mining to practices
developed to regulate production at Toyota factories. In doing so, this article has emphasized the
need to think technology and organizational practices together—as this special issue asks we do—
all the while suggesting that tales of continuity across technological change are as revealing as
stories of epochal shift. Attending to such continuities—on the industrial level via Toyota’s
manufacturing practices as well as on the discursive level by attention to the emergence of digital
platform theory out of automobile theory in the US and Japan—offers the opportunity to see what
practices continue from the automobile economy to the platform economy and also what gaps
there are between technology and organizational practice. Of course, an over-emphasis on
continuities can obscure real differences between Toyotism and platform capitalism. Digital
technologies and platforms in particular do see accelerations in the data-gathering possibilities of
companies that organization studies must engage with, and which I do not have the space to
engage here. However, amidst a proliferation of new periodizing concepts some attention to
longer histories is much needed. Before we hitch ourselves to new organizational models or
paradigms we best heed their obscured lineages, lest revealing continuities be papered over in
our race to the new.

This lineage is all the more significant today, as platforms themselves are now
completing their loops from automobile factories to smartphones back to the automobile with
Uber, Didi, Tesla, Waymo, Apple and their experiments with autonomous driving and city
mapping (Chen & Qiu, 2019), not to mention persistent rumours of tech companies getting into
automobile production. The recent announcement that Foxconn, Apple’s main subcontractor in
the manufacture of smartphones, is entering the electric vehicle business is a case in point (Hille,
Inagaki, & Campbell, 2021). As smartphone makers move into EV production, there is no better time to recall this automobile lineage of platform capitalism—including its ecological perils.

The platform’s automobile lineage is a reminder that even amidst the celebration of platforms by some, or the critique of their hunger for our data by others, we were never as far away from the car as we thought. Automobile manufacturing was the crucial industry and system of the 20th century (Dennis & Urry, 2009). If the lineage of platform industry and theory traced here is any indication, automobile capitalism will remain that of the 21st century as well.
Notes

1 While Cusumano made the connection at the discursive level – something I follow more closely below – he tends to treat automobile platform research as separate from digital platforms.

2 There may also be other such unseen lineages of the platform economy; this is a preliminary, Toyota-centric account of the emergence of the platform economy. Stephanie Sherman (2020, p. 406) offers a Fordist account of platforms, calling Henry Ford a ‘geopolitical platform logician who propelled automobility to planetary scale’.

3 Whereas Urry treats automobility as a ‘self-organizing, autopoietic, non-linear system’ (2004, p. 27) here I focus more narrowly on automobile production and discourses around it, as a prototype for platform capitalism.

4 A significant difference in files and platforms is that whereas files depend upon a media materiality, the fuzzier term platform designates two possible structures and orientations (vertical stack and horizontal intermediary) rather than a specific materiality. Still, insofar as some assumptions about media materiality are built into the platform concept (whether as computer hardware, as support for content, or as infrastructural intermediary between multiple parties), Vismann’s insightful treatment of files is germane to this article.

5 This analysis is based on exhaustive searches of the Factiva, ProQuest, Academic Search Complete, and Lexis-Nexis databases, among many others more closely related to the car industry (or production and engineering).

6 Here I omit a deeper engagement with what Cusumano himself sees as a major divide in his work: that automobiles are product platforms (not industry platforms) insofar as they allow for modularity within a single firm but do not rely on network effects for their popularity or value, whereas (digital) industry platforms do (2010, p. 33). While true, I would argue that given Toyota’s dependence on data, value accrued to Toyota through the more customers it had, and through its status as intermediary. Hence network effects were in fact in play.

7 These and subsequent translations from the Japanese are the author’s.
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**Biography**

Marc Steinberg is Associate Professor of Film Studies at Concordia University, Montreal, and director of The Platform Lab. He is the author of the monographs *Anime's Media Mix: Franchising Toys and Characters in Japan* (University of Minnesota Press, 2012), *The Platform Economy: How Japan Transformed the Commercial Internet* (University of Minnesota Press, 2019), and, with Rutvica Andrijasevic, Julie Yujie Chen and Melissa Gregg, *Media and Management* (University of Minnesota Press, 2021). He is also the co-editor of *Media Theory in Japan* (Duke University Press, 2017). His work has appeared in the journals *Asiascape: Digital Asia; Social Media + Society; Journal of Visual Culture; Theory, Culture & Society*, among others.
### Figures

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Figure 2: Summary of the distinct trajectories of platform theory in the US and Japan.