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Special Issue Editorial: Platform Competition in the Digital Era - Overview and Research Directions

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Editors' Comments

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Introduction

In this editorial, we provide a framing for the articles published in the two special issues on "Strategies for Surviving and Thriving Within and Between Digital Platforms" (*MISQE* Volume 20, Issue 4, and *MISQE* Volume 21, lssue 1). Our audience is academics interested in the nascent field of platform competition. For this audience, we synthesize and contextualize the eight articles in the special issue. We also provide a systematic framing designed to stimulate academic interest and practice-oriented research that can benefit current and future information systems leaders. We show how platform competition relates to and expands upon classical views of competition. We also explain why, given the exponentially expanding digitalization of business activities, platform competition has recently become a salient topic in scholarly analyses of strategy and industrial competition. The eight articles in the special issue offer a rich and diverse perspective on the various facets of platform competition, but a common theme in all of them is that they focus on digitalization effects, on firm-level competition and on consequent new (material) arrangements that shape and characterize competition.

This editorial is organized as follows. We start with a short summary and review of the definitions of platforms and digitizing. We show how digitizing shapes the emerging field of platform competition by creating new types of reach and range effects that promote platform creation and evolution. We also introduce a framework to analyze four "fronts of competition": intra-, inter-, per-[1] and pre-platform competition. We note that each front introduces different goals, concerns and dynamics that need to be considered by managers. We also note that platform competition in the emerging landscape can occur within, between and across platforms and at several layers of the digital service stack. Thus, the competitive landscape for each firm can be formed by selecting one of multiple feasible permutations of the competitive fronts and their competitive dynamics. We synthesize the eight articles in this special issue by organizing their contributions within the proposed platform competition framework. This allows us to tease out common themes by identifying the general competitive tensions created by reach and range effects associated with platform competition. To conclude, we argue that these tensions are contingent on the platform type and context and that their constant resolution determines firms' emergent competitive strategies.

Platforms, Digitalization and Competition

Platforms

Generally, platforms are sociotechnical arrangement-enabling interactions between participants. They provide *additional* value to participants that is not attainable without the platform.[2] The etymology of the term platform originates from two Latin words: *Plat*, meaning flat or level, and *forme*, meaning the shape or arrangement of parts. Together they connote a flat, possibly raised, "surface" onto which something can be placed. Conceptually, the *plat* (physical part) implies the presence of a pool of resources on which interactions can take place, and the social part includes a set of rules, expectations, norms and goals that undergird, organize and govern participants' interactions and the benefits attained. This broad definition covers a wide range of interactions, such as those happening in or with medieval marketplaces, gay bars, credit cards, stock exchanges, or on digital platforms such as Wintel, Android, app stores, Uber, AirBnB and Kickstarter.

A special case, and our focus, are platforms that enable interactions associated with economic exchanges.[3] In such settings, the platform can

1 Per in Latin means across or between.

2 Hagiu, A. and Wright, J. "Multi-Sided Platforms," *International Journal of Industrial Organization* (43), 2015, 162–174.

3 Beyond our scope are platforms (e.g., social media platforms), where nations and political movements compete for influence and/or

be defined as "an intermediary, with which market sides affiliate directly, enabling direct interactions between the sides to exchange platform goods."[4]

Platforms as sociotechnical arrangements differ from vertical integration and the resulting hierarchical forms of controlling participants' behaviors[5] (visible hand). With the latter, participant interactions can be wider in scope and intensity but the interactions are not autonomous. One party will release the right to control their behaviors to another party. Platforms, however, always manifest forms of market-based control,[6,7]where each participant's interactions are, in principle, voluntary and autonomous (invisible hand).

The notion of a platform as a form of economic exchange has a long history. The early forms were medieval marketplaces, free towns and, later, stock exchanges. These were then followed by credit cards and malls, for example. The term gained currency in the 1990s in the operations management and product development literatures. These research streams introduced the concept of the *platform product*, which "meets the needs of a core group of customers but [is designed] for easy modification into derivatives through the addition, substitution, or removal of features."[8] Platform products are generally viewed as firms' *internal platforms*, enabling interactions between a wider range of (external) participants (also called complementors) involved in and contributing to product design and use and increasing the value to end consumers. Product platforms can be defined as "a set of subsystems and interfaces that form a common structure from which a stream of derivative products can be efficiently developed and produced."[9] As such product platforms promote novel interactions between platform participants and increase the variability and product value to participants. Such product platforms are common in cars (e.g., Volkswagen/Audi; Toyota), computer electronics and software (WINTEL). They enable faster product variation and a combination of scale and scope economies during product design and manufacturing.[10]

These product and exchange platforms surged in the 1990s because of a growing interest in platform investments, platform technologies (enabling "platformization" i.e., how to turn products into "meeting places" for novel participant interactions and forms of deriving value) and platform thinking. These new logics have deeply permeated innovation management and strategy research since then, resulting in a myriad of models showing how firms can effectively position and compete with their products by implementing design rules that guide platform designs (such as modularization).[11] This research has also produced typologies of the ways in which participant interactions can be organized across subsystems of industrial organization, including 1) internal, 2) supply chain and 3) industry platforms.[12]

Digital Platforms

Platforms as a means of interaction and value exchange have proliferated over the last 30 years. In a relatively short period, they have become a dominant form of value creation and extraction in many industries.[13] Their recent prominence is largely due to extensive digitizing of analogic forms of representations involved in product or platform interactions (e.g., invoices, transactions,

dominance, as witnessed during the recent invasion of Ukraine.

4 Karhu K., Heiskala, M. and Ritala, P. T. "Beyond the N in Network Effects: A Unified Platform Market Model with Five Network Externality Types," 2021, Unpublished Working Paper.

5 Chandler, A., Jr. The Visible Hand: *The Managerial Revolution in American business*, 1977, Belknap. Press of Harvard University Press.

6 Malone, T., Yates, J. and Benjamin, R. "Electronic Markets and Electronic Hierarchies,"*Communications of the ACM*, (30:6), 1987, pp. 484-497.

7 There are some blurred forms of platforms between pure markets and pure hierarchies such as IoT platforms in our case. Such forms are created for economic benefits for participants but they do not exhibit just competition but forms of coopetition which is also increasingly common as platforms have become more common.

8 Wheelwright, S. C. and Clark, K. B. "Creating Project Plans to Focus Product Development," *Harvard Business Review* (70), 1992, pp. 67-83.

9 Meyer, M. H. and Lehnerd, A. P. *The Power of Product Platforms: Building Value and Cost leadership*, 1997, The Free Press.

10 Gawer, A. "Bridging Differing Perspectives on Technological Platforms: Toward an Integrative Framework," *Research Policy* (43:7), 2014, pp. 1239-1249.

11 Baldwin, C. Y. and Woodard, C. J. "The Architecture of Platforms: A Unified View," in *Platforms, Markets and Innovation*, A. Gawer (Ed.), Edward Elgar Publishing, 2009, pp. 19-44

12 Gawer, A. "Platform Dynamics and Strategies: From Products to Services," in *Platforms, Markets, and Innovation*, A. Gawer, (Ed.), Edward Elgar Publishing, 2009, pp. 45-76.

13 Parker, G. G., Van Alstyne, M. W. and Choudary, S. P. *Platform Revolution: How Networked Markets Are Transforming the Economy and How to Make Them Work for You*, 2016, Norton.

equities, blueprints, tire pressures, locations, personal information, exchange properties etc.). Continued digitizing has enabled faster, cheaper, more extensive and more diverse interactions between product/service users, between users and producers, and between those participating in product exchange or use. This has resulted in novel forms of digitalization, which now manifest as novel platform types or expanding and transformed existing platforms. This also explains the rapid growth and success of a new breed of platforms and platform arrangements—for example, Google, Amazon, Facebook, ITunes, Spotify, Uber and AirBnB.[14] Digital platforms now represent the dominant sociotechnical arrangement, governing most production and exchange activities associated with products and services in industrial organizations. Given the scope and extent of digitizing, most participant interactions on platforms are currently mediated by digital representations.

Generally, the constant platformization of the industrial economy can be attributed to the effect of several unique features that characterize digital objects (i.e., the results of digitizing), how their use is organized and the effects this has on social settings (digitalization). These novel features create unprecedented scale and scope benefits that accrue from the loosely coupled product architectures of digital products and their bitstring interfaces. These features enable continued combinatorial innovation, easy repurposing and generativity,[15,16] which radically expand the variety and volume of participants on (product) platforms (reach effects) and widen the novelty and range of interactions between participants (range effects). Digital platforms make interactions independent of place, time or other constraints, and enable these interactions to take place across multiple resource pools (i.e., varying networks and devices) (reach effects). Digitizing and digitalization have amplified both reach and range effects, which has led to the radical rearrangement and deep transformation of existing platforms (such as stock exchanges or credit cards) and created new types of platforms that have disrupted entire industries (e.g., Amazon, AirBnB) and created new ones (e.g., art NFTs). The key drivers of such digitalization and platformization are:

(1) Automation and efficiency effects. For example, in the 20 years between 1990-2010, the trading costs in the NYSE and NASDAQ went from ca. $20.00 per transaction to $0.001, while the time needed to execute trades went form 30 minutes to 4-5 nanoseconds (billionths of a second).

(2) Reach effects. The number of participants trading in the NYSE and NASDAQ has gone from a few thousand privileged traders and market makers to millions of retail investors (distributed across the globe, in principle). With the expansion of the futures markets during traditional nontrading hours, trading has become a 24/7 operation.

(3) Range effects. New trading services and products have emerged in multiple trading platforms, from initial index-based equities to variants of futures and complex derivatives, with new additional services and forms of trading such as high-frequency trading (HFT).

(4) Information effects. The transparency of the state and scope of interactions in stock exchanges have increased. Earlier market positions were primarily visible only to market makers while they are now, in principle, open to anyone willing to bear the cost. This has resulted in the reduction of market maker spreads from 25-30 to 0.1 cents, for example.[17]

These effects naturally vary from one platform to another, but most platforms represent all such effects in one form or another. The most important effects from the viewpoint of understanding the emerging field of platform competition are *reach effects* (the increase in the number and variety of participants and the volume, scale and frequency of interactions) and range effects (the increase in the variety and diversity of interactions and related value propositions). Reach effects result in positive network effects, while *range effects* allow for

14 Tilson, D., Lyytinen, K., & Sørensen, C. "Digital Infrastructures: The Missing IS Research Agenda," *Information Systems Research* (21:4), 2010, pp. 748-758. This is famously expressed in Andressen's statement "Why Software Is Eating the World"

15 Lyytinen, K. "Innovation Logics in the Digital Era: A Systemic Review of the Emerging Digital Innovation Regime," *Innovation: Organization and Management*, forthcoming.

16 Piccoli, G., Rodriguez, J., Grover, V. "Strategic Initiatives and Digital Resources: Construct Definition and Future Research Directions," *MIS Quarterly*, forthcoming

17 MacKenzie D. *Trading at the Speed of Light: How Ultrafast Algorithms Are Transforming Financial Market*, 2021, Princeton University Press.

the creation of while range effects allow for the creation of new value and network effects new value and network effects.[18] Together, these effects provide constant improvements in the localization and performance of platform interactions within novel settings implicating additional participants. Examples include the use of mobile phones, the introduction of intelligent agents (e.g., Echo, Alexa) and the recent rush to autonomous vehicles.

Correspondingly, the organization of the layered modular architecture of digital platforms offers the capability to expand the network reach of the software services by embedding platforms into other settings (multihoming).[19] The range effects directly result from the layered modular architecture whenever the content and services can be flexibly bundled, unleashing the combinatorial innovation potential of software modularity and repurposing capabilities and resulting in generativity (i.e., the constant re-innovation of technology by new audiences).[20] A visible outcome of such effects is that most physical products now come with digital folds and, as a result, the digital features and services of most physical products can be constantly expanded, resulting in platformization.[21]

Platform Competition

As new platforms and competitive environments have emerged, the conditions, principles and rules of competition have radically changed.[22] In most industries, organizations face a new kind of competitive reality, as illustrated by the recent rapid fall of many iconic firms, such as J.C. Penney, Neiman Marcus, Brooks Brothers, or Sears to name a few in the United States. All of these companies were early stalwarts of a successful industrial business logic.

Competition can be defined as the rivalry between two or more parties striving for a common goal that cannot be fully shared. However, in platform competition, participants operate within and/or across platforms. Rivalry thus includes elements of cooperation, and the arena for competition itself will keep changing as the boundaries of markets are constantly changed and blurred. Ultimately, the focus is on the conditions and means necessary for firms to survive and thrive in the new competitive landscape, which is shaped by platform competition. The main area of potential research impact thus revolves around the *new* conditions, rules and dynamics of rivalry engendered by the emergence of platforms in growing numbers within a variety of industries. These firms may be incumbents transitioning from a traditional value chain model to a platform design, or new "born digital" agile ventures seeking to disrupt an industry or marketplace. Such conditions are defined primarily by the type, extent and value of the interactions enabled by the involved platforms, their scarcity conditions (expressed mostly in positive network effects), and the mechanisms through which value is created, extracted and shared on the platform between involved participants. Therefore, analyses of platform competition primarily focus on how to create, balance, and sustain reach and range effects (that enable positive network externalities) while continuing to add value to a diverse set of participants.[23]

It is useful to contrast platform competition with traditional and familiar forms of competition that dominated the era of industrial organization and its strategy concepts. During this era, competition conditions were defined by strictly circumscribed markets and related conditions for access, market visibility (advertising/branding) and rules of exchange (such as consumer regulation/antitrust laws).[24] The conditions defined vertical industries and associated rules of competition according to standard industrial classification (SIC) codes, for example. In addition, the competition was shaped by geographical jurisdictions and regulatory regimes (customs, taxes, logistics etc.). Many of the rules and principles that govern such competition have been expressed in popular models of competition taught

18 Karhu. K, Heiskala, M. and Ritala, P. T., op cit., 2021.

19 Yoo, Y., Henfridsson, O., & Lyytinen, K. "Research Commentary—The New Organizing Logic of Digital Innovation: An Agenda for Information Systems Research," *Information Systems Research* (21:4), 2010, pp. 724-735.

20 Tilson, D., Lyytinen, K. and Sørensen, C. op. cit., 2010.

21 For an example see Sandberg J., Holmström J. and Lyytinen, K. "Digitization and Phase Transitions in Platform Organizing Logics: Evidence from the Process Automation Industry," *MIS Quarterly* (44:1), 2020, pp. 129-153.

22 Parker, G. G., Van Alstyne, M. W. and Choudary, S. P., op. cit, 2016.

23 Karhu, K., Heiskala, M., Ritala, P. T., op cit., 2021.

24 An excellent and detailed description of how such markets and competition were formed in the U.S. can be found in Chandler, A., Jr., op. cit., 1977.

in marketing (e.g., product, price, place, promotion),[25] or strategy (e.g., cost leadership, differentiation, segmentation).[26] Generally, in these models, competitive advantage is determined by the firm's relative advantage in economies of scale and scope—i.e., efficiency and effectiveness differences that accrue from larger production scales, better products, better branding and positioning.

As demonstrated by the rise of platforms and the corresponding demise of companies that followed industrial-era competition recipes, platformization within and across industries has been disruptive. It has created unseen and novel conditions that characterize contemporary intra- and interplatform competition, which was a relatively uncommon phenomenon until recently.[27,28] In addition, new forms of competition continue to emerge at a rapid pace as digitizing and subsequent digitalization arrangements take root across industries. Many of these emerging forms of competition remain poorly understood. They emerge organically from extensive experimentation and learning-by-doing fueled by technological advances, ample access to venture capital and intense innovation. Indeed, one goal of this special issue is to shed light on the new emergent forms of platform competition by reporting a diverse set of detailed case studies describing unique industry, technological and geographical settings where (digital) platforms are approached as a new element of the firm's competitive landscape. Below, we advance a definition and describe the organization and emerging architecture that governs platform competition.

Framing Platform Competition

We define *platform competition* as a type of rivalry where two or more organizations strive to fulfill their (partially) nonshareable goals by participating in platform interactions and where such interactions will reduce the value gained directly or indirectly by other parties from such interactions.[29] As noted above, at some stage or setting these interactions involve exchanges of "market goods." These can be information, service, physical products or other intangible benefits. The properties of these exchanges and ways of creating value from them are far more complex than those found in traditional exchanges within markets (and related platforms). The complexity is largely due to the digitizing of some or all elements of the involved exchanges (See Figure 1) and the presence of layered modular product architecture in enabling such exchanges. The following typology maps key competitive fronts that characterize digital platform competition:

(1) Intraplatform competition. Competition arises in two-sided or multisided exchanges where demand- and supply-side participants interact on the platform as dictated by the rules, resources and forms sanctioned by the platform owner. The owner controls and operates the platform and, in return, captures value from the participant's (complementor's) interactions directly (e.g., by selling a digital service) or indirectly (e.g., by taking a financial cut of products sold by participants). One complicating factor in multisided exchanges is that participants often operate simultaneously in multiple roles (as both demand- and supply-side users or as owner/supply-side users), creating unique tensions for platform operation and evolution.[30] We define such competition as *intraplatform competition* because it encompasses rivalries between heterogeneous platform participants (participants/owners).

(2) Interplatform competition. Competition ensues in specific activity domains where the exchanges take place and create competition between partially overlapping platforms that seek to enable similar interactions between heterogeneous pools of participants (e.g., Apple iTunes vs. Spotify vs. GooglePlay), or between different, overlapping domains and markets (e.g., Mobilepay vs. credit cards vs. Apple Pay). We define such competition *interplatform competition* in that it encompasses rivalries

25 Kotler, P. *Marketing Management*: Analysis, Planning and Control, 1967, Prentice-Hall.
26 Porter, M. E. *Competitive Strategy*, 1980, Free Press.
27 See, e.g., Parker, G. G., Van Alstyne, M. W. and Choudary, S. P., op. cit., 2016.
28 Cennamo C., Diaferia L., Gaur A. and Salviotti, G. "Platform Disruption: How Digital Platforms Re-Architect Existing Markets," 2022, current issue.
29 In platform competition there are also new opportunities to expand reach and range through cooperation on sharable goals.
30 See for example Wareham, J., Fox, P. B., Giner, J. L. C. "Technology ecosystem governance." *Organizational Science* (25:4), 2014, pp. 1195-1121.

between platforms within and across multiple partially overlapping competitive arenas.

(3) Per-platform competition. Competition emerges across platforms when a specific firm competes with its products and services in a new competitive landscape. This means that firms either have to establish their "own" platform for a specific market/domain or reach out and participate on other platforms to promote its services/products or carry out exchanges on those platforms. This effort needs to be integrated with the traditional forms of competition for many incumbents. This form, in terms of extent and volume, is probably the most common form of competition that most firms experience in the contemporary economy. We define such competition as *per-platform competition* because it encompasses rivalries that a firm engages in across platforms while competing in its business ecosystem.

(4) Pre-platform competition. Competition emerges between platform owners and participants of various innovation communities that invent and/or implement new platform features that are likely to improve the reach or range effects of the focal platform. This competition focuses on the forms of control and sharing of invented digital resources (e.g., through open source development) and how associated intellectual property is (non)monetized as part of the competitive platform strategy. This precompetitive activity materializes and improves the platform's scaling and flexibility (reach and range effects) and/or removes control points for value extraction by (other) platform owners or complementors within the business ecosystem. We define such competition as *pre-platform competition* because it encompasses technology-focused rivalries in which a firm engages while innovating around its service stack and seeking to monetize, protect and/or share its digital assets and related intellectual property rights.

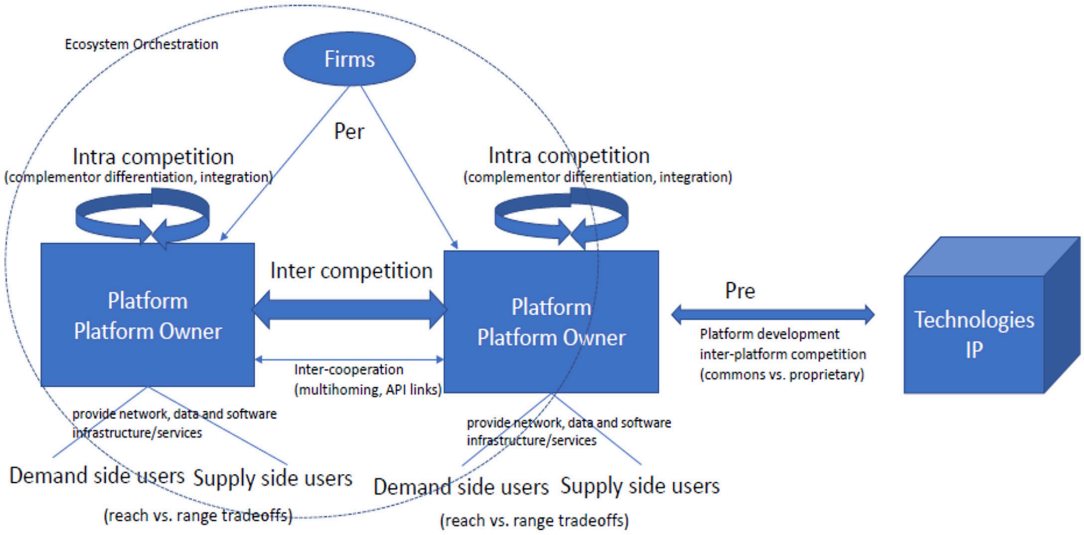
Generally, as can be inferred from our definition and description, platform competition forms a highly complex system. Traditionally, pipeline companies were process oriented toward a single competitive market (for each SBU) and sought to improve the quantity and quality of their value-adding activities to increase the scale and scope effects within that market. In contrast, for platform competition, companies need to become network oriented, constantly improving the quality and quantity of their interactions on and across the platforms to generate value for involved participants. At the same time, they need to capture enough value to prosper and survive. In a pipeline company, a firm's competitive position and dynamics primarily concern the management of the pipeline by coordinating the gaps between supply and demand. In a platform company, competition emerges as a dynamic process of ecosystem orchestration, where a firm seeks to find a "feasible" niche in its evolving business ecosystem. The orchestration tries to position the firm into a dominant location in the ecosystem by expanding its control over other ecosystem participants. This happens by fostering and controlling a complex set of dependencies within the ecosystem.

In this new competitive landscape, the firm's attention needs to move outward toward multiple arenas and potential platform interactions across the full ecosystem. The value creation and extraction take place simultaneously on multiple competitive fronts.[31,32] The firm needs to address reach vs. range trade-offs in its intra- and interplatform competition and balance the pace of competition and its focus across several competitive fronts. The firm needs to also address stability vs. evolvability trade-offs that emerge on its precompetitive front. Generally, depending on the firm's location within its business ecosystem, the firm needs to decide where and how to compete in multiple arenas. Typical compositions of platform competition involve platform owners engaging in cycles of synchronized intra-, inter- and pre-platform competition. For firms offering complements, they need to compete through cycles of intraplatform and per-platform competition (e.g., multihoming). Traditional incumbent firms in established industries face a new variety of competitive cycles as they venture into platform competition. This could involve participating on

31 See, e.g., Staykova, K. and Damsgaard, J. "How Digital Platforms Compete Against Diverse Rivals," *MIS Quarterly Executive* (21:4), 2021, pp 275-295.

32 Rövekamp, P., Ollig, P., Buhl, H. U., Keller, R., Christmann, R., Remmert, P. and Thamm, T. "How Dr. Oetker's Digital Platform Strategy Evolved to Include Cross-Platform Orchestration," 2022, current issue.

Figure 1: Framework for Platform Competition



other platforms (intraplatform and per-platform competition) and potentially engaging in new forms of pre-platform competition. Because of this heightened complexity, firms need to balance and coordinate their competitive moves across several competitive fronts. They must constantly be ready to pivot as they face new tussles and new confrontations in their business ecosystem. As exemplified by several articles in this special issue, the dynamics of, conditions of and for, and rules for each competitive front differ and it is difficult to transfer learning from one competitive front to another—the rules may even contradict each other, creating constant tensions. The rules and principles are also contingent—they depend on the size and position of the firm and the size, nature and maturity of the platform(s) on which the firm participates. In addition, past technological choices around platform stack(s) have been path dependent, with the scope and rate of the firm's learning about the nature of interactions and potential reach and range effects varying and shaping future competitive moves.

Given the complex and dynamic character of the emerging competitive landscape, there is ample scope for insightful practice-oriented research on platform competition. Most studies to date have examined platform competition from the viewpoint of the platform owner and addressed related scaling and or governance issues associated with intraplatform (owner/complementors)[33] or interplatform (between platforms) competition.[34] These studies have mostly focused on conditions that either create positive externalities[35] or examine conditions for platform ignition and the initial creation of positive network externalities.[36] As we describe next, the case studies in the special issue report a far greater diversity of competitive choices that firms need to make across several competitive fronts in their business ecosystems.

Review of the Individual Contributions

We next synthesize the contributions of the articles included in this special issue. The pivotal insights culled from the articles around

33 Constantinides, H., Henfridsson, O. and Parker G. "Digital Infrastructure and Platforms Information Systems Research," *Information Systems Research* (29:2), 2018, pp. 381-400.

34 See for example Karhu, K., Gustafsson, R. and Lyytinen, K. "Exploiting and Defending Open Digital Platforms with Boundary Resources: Android's Five Platform Forks," *Information Systems Research* (29:2), 2018, pp. 479-497.

35 Tiwana, A. Evolutionary Competition in Platform Ecosystems. *Information Systems Research* (26:2), 2015, pp. 266-281

36 Ondrus, J., Gannamaneni, A., Lyytinen, K. "The Impact of Openness on the Market Potential of Multi-Sided Platforms: A Case Study of Mobile Payment Platforms," *Journal of Information Technology*, (30:3), pp. 260-275.

platform competition are summarized in Table 1. We developed the summary by applying the platform competition framework represented in Figure 1 as a baseline. The framework organizes the articles into four groups, where each group includes the articles that focus on a specific competitive front. We then analyzed the articles for a synthesis in terms of how the competition had been framed for that front in each group by identifying the germane facets of competition reported in each article. Accordingly, the articles in Table 1 are categorized based on their focus on an identified competition front, i.e., inter- intra-, per- and pre-platform competition. For each article, the table then highlights how competition was synchronized with other competitive fronts (if there are any other front labels in the Competition Front column). For each article, we then report the nature of the focal platform(s) and the types of interactions enabled. The next column enlists the types of strategies (competitive moves) that form the empirical evidence for the conducted competitive analysis. Next, we note the primary digitalization effects pursued by the focal digital platform. The next column summarizes the key challenges faced by the firm in orchestrating moves on the competitive front. Finally, the last column summarizes the core principles through which the firm sought to compete in the given competitive front.

This special issue covers articles focusing on each competitive front (see Table 1). Two articles focus on interplatform competition (with Salesforce, Mobilepay), two focus on per-platform competition (with Telco and Dr. Oetker), one focuses on intraplatform competition (Steam), one (Spotify) focuses on both intra- and inter-level competition, and two focus on pre-platform competition (concerning digital disruption in industries/open commons,). Given the noted complexity of platform competition, it is no surprise that, in many cases, these foci are highly contingent on the specific context, the nature of the platform and its evolutionary stage. They are also interrelated. Considerations of interplatform competition necessarily include aspects of intraplatform competition since, to compete as a platform, all participants (complementors) need to have an equitable stake in the competition and the platform itself needs to balance reach and range in offering its value proposition (goods) to the market. Similarly, intraplatform competition among participants also includes how participants engage with the platform owners, which influences interplatform competition. Per-platform competition involves the broader ecosystem where the focal platform competes but also includes intraplatform competition on other platforms on which the focal platform participates and could be competing for market share.

The two cases focusing on interplatform competition (from the viewpoint of the platform owner) exhibit different competitive dynamics. Salesforce[37] is a dominant software (product) platform offering a wide range of complements. The key question posed is whether and how Salesforce's complementor acquisitions helped bolster its competitive position in relation to similar competing product platforms (Oracle, SAP). Mobilepay[38] is a transaction platform for mobile interbank payments (and related transfers between client accounts). It analyzes how Mobilepay had to compete across multiple heterogeneous rivals, including Apple Pay, credit card companies, other banks' mobile payment platforms, to expand its reach (and related network effects). The article also shows how within this dynamic, the bank as owner and orchestrator had to constantly balance the pursuit for reach with a coordinated effort to manage its range of services.

Per-platform competition embraces a holistic ecosystem perspective of competing both as a platform owner and a participant. The Telcocorp[39] case examines how an established telecommunications company transformed its existing relationships and became a platform owner and an orchestrator of its own and complementor services. The company fostered co-creation across it partners as it sought to launch new types of content and service "bundles" and related platform services around a common IoT solution (physical/network layers). The article narrates the firm's experimental search for one or possibly several feasible IoT

37 Staub, N., Haki, K., Aier, S., Winter, R., Magan, A. "Acquisition of Complementors as a Strategy for Evolving Digital Platform Ecosystems," *MIS Quarterly Executive* (21:4), 2021, pp. 237-258.
38 Staykova, K. and Damsgaard, J. op cit., 2021.
39 Marheine, C., Engel, C., Back, A. 2021): "How an Incumbent Telecoms Operator Became an IoT Ecosystem Orchestrator," *MIS Quarterly Executive* (21:4), 2021, pp. 297-314.

platform solutions, created by using their IoT data pipes and sharing the data across platform participants in specific industry settings. The second article in this category approaches the new competitive landscape from the viewpoint of a traditional firm in an established manufacturing industry (Dr. Oetker).[40] It illustrates how Dr. Oetker had to constantly experiment and navigate a complex competitive landscape to manage many decisions concerning which platforms to use, whether to create its own platform and the extent to which it should use traditional competitive mechanisms.

The Spotify[41] case narrates the evolution of a popular digital content delivery platform that competes with both device-specific (e.g., Apple Music) and generic platforms (e.g., Sirius). Given the lack of a single device for the content, the key focus here is on how to manage and coordinate platform feature development (partially through complementors) in a way that overcomes the challenges of being unable to leverage device-specific features to compete while growing the market by engaging with several device platforms. The company could not change its focus and needed to compete both as a platform (interplatform) and as a participant (interplatform) on other platforms, with each front reinforcing the other.

Intraplatform competition involves issues of how participants offering digital services on a platform can compete effectively. The article (on data from Steam)[42] discusses how large and small complementors on gaming platforms can successfully compete. Many platforms have a few large participants who dominate the platform market (following the power law and related 80-20 rule of how revenue is distributed in the market). The question then is: What are the specific strategies and tactics that the complementors should follow to reach that position? Specifically, the study focuses on the resource differential between the two types of complementors that lead to different strategy playbooks in developing that position.

40 Rövekamp, P., Ollig, P., Buhl, H. U., Keller, R., Christmann, R., Remmert, P. and Thamm, T, op. cit., 2022.

41 Skog, D., Sandberg, J. and Wimelius, J. "How Spotify Balanced Trade-Offs in Pursuing Digital Platform Growth," *MIS Quarterly Executive* (21:4), 2021, pp. 259-274.

42 Hukal P., Kanata I., Ozalp H. "Different Strategy Playbooks for Digital Platforms Complementors," 2022, current issue.

The "pre-group" consists of two articles. They both focus on the precompetitive phase of interplatform competition by conducting a general illustrative analysis of conditions and rules of how firms can compete in the precompetitive front under specific circumstances. The first one (on digital platform disruption)[43] analyzes conditions under which the industry-level effects of digitization are likely to become so significant that they generate extensive reach and range effects conducive to creating competitive, disruptive platforms. The analysis focuses on industries that currently operate with few prior platforms. The article identifies three sets of initial conditions—information problems, decomposability of services and unmet customer needs—that favor the creation of platforms in the industry and make non-platform incumbents vulnerable to disruption. The second article in this category (on open commons[44]) focuses on technological and IP-related pre-platform competition across platforms. In particular, it discusses how the platform owners can build and evolve their service stacks by relying on open-source licensing and external innovation communities. The precompetitive moves surrounding "commons" allow platforms to enhance platform offerings by changing the platform's reach or range effects, and/or offer a means to protect the platform from hostile control focused competitive moves. The article describes how platform firms need to launch a staged and disciplined process of engaging in precompetitive moves that help them navigate, manage and learn from the open commons space. The authors illustrate how companies should configure their service stacks using open source components, which will then become a critical element in their platform competition portfolio in the long run.

Common Themes: Initial Analysis

We, as senior editors, have been blessed with unusual luck in being able to compile such a diversity of cases and types of platform

43 Cennamo C, Diaferia L., Gaur A. and Salviotti, G., op. cit., 2022.

44 Legenvre, H., Autio, E., Hameri, A.-P. "How to Harness Open Technologies for Digital Platform Advantage," 2022, current issue.

Table 1: Platform Competition Framework and Cases Studies

Case Study/ Data	Competitive Front(s)	Type of Platform	Competitive Strategy	Digitalization Effect for Value	Key Challenges	How to Compete?
Salesforce (1)	Interplatform competition	Mature Software Product with New Complements	Acquisition	*Reach Effects*: Broader offerings to both complementors and clients *Range Effects*: Extend the core technology and functionality of the product	•Difficulty in understanding overlapping offerings •Integration across offerings	•Clarify strategic direction for acquisitions •Ensure coherency and consistency of offerings and communicate them clearly •Develop a flexible approach to integrate complements
"TelcoCorp" (2)	Per-platform competition	New IoT Data Sharing/ Service	Initial Orchestration of a Platform Ecosystem	*Reach Effects*: Providing a solution to specific customer problems from which ecosystem of partners can grow. *Range Effects*: Co-creation of value with flexible partner relationships/ contracts	•Deciding whether to make or buy interoperable IT infrastructure •Tension between focus on the supply side (offerings) vs. the demand side (growth) •Extending traditional buyer-supplier relationships to IoT flexible contracts •How to manage trade-offs between custom solutions with possibilities for scaling	•Shorten time-to-market with off the shelf solutions •Expand ecosystem beyond existing customer base •Strive for individual custom solutions while looking for opportunities to generalize and scale •Monetize data on the platform
Mobilepay (3)	Intercplatform competition	Payment Service	Offensive and defensive actions to compete on multiple battlefronts, including other platforms related to other services	*Reach Effects*: Grow network by establishing interoperability with bigger partners, reducing prices, and building novel functionalities that lock in customers. *Range Effects*: Augment value proposition through innovative functionalities, imitating competitors, and collaborating for capability building	•Vulnerability to partners (e.g., for infrastructure) becoming rivals •Speed to develop capabilities and/or when to rely on partners that creates a dependency •Leverage collaboration to build up capabilities to compete with large non-native disrupters entering the market	•Leverage existing IT capabilities to establish control over each battlefront, but abandon the synergies to retain control over a battlefront •Prevent users from multihoming to rival platforms •Grow the user network preemptively by mirroring competitors' key features while denying interoperability •Identify and prioritize users who ultimately decide the winner of the competitive battle
Spotify (4)	Inter- and Intraplatform competition	Content/ Service	How to scale the platform across multiple device platforms and compete with related content services (platforms)	*Reach Effects*: Make service inexpensive and available across multiple devices *Range Effects*: Careful partnering with device platforms and allow outbound interfacing through APIs	•Rapid growth challenges infrastructure •Complementor development restricts growth across platforms •Over-dependency on device platforms	•Understand and facilitate "homing" preferences of customers •Manage growth through careful control of platform and device dependencies •Reduce dependence on device platforms through careful partnerships

Table 1: Platform Competition Framework and Cases Studies (Continuation)

Case Study/ Data	Competitive Front(s)	Type of Platform	Competitive Strategy	Digitalization Effect for Value	Key Challenges	How to Compete?
Dr. Oetker (5)	Per-platform competition as an owner and complementor	Augmenting physical product with additional content/experience through platform orchestration	Cross-platform orchestration strategy	Reach effects: Consider the supply side (grow core offerings) and the demand side (grow network) Range effects: Managing customer needs (touchpoints) and deciding where to collaborate vs. compete across own and other platforms	•Developing an overarching goal for per-platform strategy instead of piece-meal initiatives •Recognition of the value of collaboration in lieu of inclination toward platform ownership	•Recognize stages of platform and capability growth and develop a digital platform strategy for each phase •Articulate and implement goals and structures for per-platform orchestration early in the process.
Data from Steam (6)	Intraplatform competition by complementors	Product platform with gaming complements	How to differentiate between long tail of complements where tactics depend on resources/ visibility	*Reach effects*: By enhancing content discoverability to leverage platform's network effects *Range effects*: By selective modularization (investing in specific technical features provided on platform) and asset fortification (developing unique resources), complementors differentiate offerings	•Challenge for minor complementors to work around resource constraints •Major complementors must balance exclusivity on a platform due to unique resources with multihoming on other platforms	•Minor complementors need grass-roots promotion and niche tactics with respect to features and resources to compete •Major complementors need to leverage asset fortification with content discovery and selective modularization
Digital platform disruption (7)	Industry-level early pre-platform competition	Product/service augmented with multisided interactions	Pooling information offerings across demand and supply-side interactions	*Reach effects*: Multisided platforms will pool services and expand markets *Range effects*: Mitigating information asymmetry, disaggregating services into interconnected modules, and exploiting unaddressed customer needs/preferences with new services	•Identifying and addressing information asymmetry, complexity and fragmentation •Modularizing offerings and providing mechanisms for flexible recombination •Addressing latent heterogenous customer needs within the confines of modularization	•Incumbents need to diagnose their disruption list based on the level of information problems, product modularity and unaddressed needs in their existing and potential markets
Open Source Platforms (8)	Pre-platform competition	Variety (architectural/ technological choices)	Sponsor, support, safeguard and siphon strategies to improve and protect value	*Reach effects*: Attract best developers through opening governance and norms of reciprocity, amplifying the commons resource *Range effects*: Mobilize resources toward resolving bottlenecks and expanding current and future offerings	•Participants will get high rents through proprietary resource control •Infrastructural bottlenecks constrain the ability of ecosystem participants to increase the range and scale of their offerings	•Identify resources and projects that are strategic and should be protected vs. those that can benefit from participation •Determine positioning level in commons ecosystem game as an adopter or contributor or at steering, mobilizing or projecting levels

competition into a single special issue. We were also pleasantly surprised by the quality of the papers. At the same time, we found it challenging to write this review because of the complexity, dynamism and novel aspects that each article reveals about contemporary platform competition. The reader can gain a preliminary understanding of each article, its content and contribution by just reading our introductory note on the special issue (*MISQE* Volume 20, Issue 4) and by glancing through Table 1. The rich details of each case will be left to each reader to examine through a thorough reading of each article. Below, we instead identify common themes, issues and logic that cut across all or some of the articles and the competitive fronts they cover.

Overall, the richness of the dynamics in firms' competitive landscapes that the included articles narrate demonstrates the heightened complexity brought by platform competition and the consequent challenges it poses for the participating firms. The articles vividly illustrate that their new competitive landscapes are never at a standstill and pose constant challenges for the firm to orchestrate effective and prompt responses. Therefore, platform competition calls for *configurational flexibility* to address the constant, multiple and heterogeneous changes in firms' business ecosystems. However, formulating generic models and competitive rules characteristic of competition models and explanations during the era of industrial organization can be misleading and even dangerous. We need extensive analyses of larger sets of competition cases and situations before we can fully understand how each competitive front behaves and what its competitive logic is. We also lack research into how the four competitive fronts *interact* and evolve and how they are *balanced* during competition by firms. None of the articles truly addressed the issue of cross-balancing competitive fronts.

Pivotal dimensions that shape the contours of the emerging arena of platform competition are, however, already clearly visible in the eight articles. Some of them align with past seminal analyses of the nature of platform competition.[45] Several articles recognize the need to *control heterogeneous ecosystem dependencies* produced through platform creation and participation (e.g., Salesforce, TelcoCorp) and the need to understand the role of *resource dependencies originating from the deployment of unique service stacks* (e.g., Steam, Spotify, Open Source). These dependencies determine and/or enable participant interactions, their experiences and value extraction. Some articles observe common challenges in handling reach and/or range effects and the associated trade-offs (e.g., TelcoCorp). The articles also recognize challenges in moving from traditional pipeline models to platforms where *relationships and governance of value* needs to be redefined (e.g., Dr. Oetker, TelcoCorp). Also, the need to *rapidly pivot* when considering fast-moving competition. This requires the need to *"build" new capabilities expediently* (e.g., Mobilepay). Finally, *co-creating value with complementors both internally and externally* on other platforms in several competitive spaces requires *careful resource and rule orchestration*. Complementors themselves need to evaluate their *dependencies on the platform* and *opportunities for multihoming* while the platform owner seeks to maintain exclusivity (e.g., Salesforce, Steam) or not (e.g., Spotify).

As part of the analysis, we have also synthesized several critical factors and competitive strategy trade-offs that were foregrounded for each competitive front (Table 2). This synthesis of common factors and strategies is organized along the four competitive fronts of Figure 1. For each front, we synthesized the critical factors that were attended to in each article within this competitive front and the consequent competitive strategy trade-offs that had to be addressed. On the intraplatform competition front, the critical factor faced by owners and complementors alike was the challenge of how to integrate all services into a uniform experience on the platform while still being able to differentiate between varying offerings on the same platform. For complementors, the challenge was how to integrate their offerings on each platform in ways that do not exclude multihoming and innovation beyond the possibilities on the given platform. For owners, the challenge was how to maintain the uniformity of the experience while still enabling innovation by complementors. This

45 See, e.g., Constantinides, H., Henfridsson, O. and Parker G., op. cit., 2018. or Parker, G. G., Van Alstyne, M. W. and Choudary, S. P., op. cit., 2016.

Table 2: Key Trade-Offs in Each Competitive Front

Competitive Front	Critical Factor(s)	Competitive Strategy Trade-Offs	Illustrations
Intraplatform front	Integration with platform visibility/ differentiation	Decide how to integrate (dependency) on a platform that can limit multihoming Carefully allocate resources for promotion and innovation	Primary: (6) Secondary: (1)(2)(3)(4)(5)(7)(8) e.g., *(6) On the Steam gaming platform, large and small complementors need to compete differently based on the resources needed for visibility and integration with the platform*
Interplatform front	Integration of complementors Participation on other platforms Flexible relationships and strategies	Breadth of complementors increases value proposition but also distort offerings Deep vertical relationships improve value for customers on each platform but limit expansion opportunities on others Modularized offerings render services accessible on other platforms but make it more difficult to manage related growth	Primary: (1)(3)(4) Secondary: (6)(7)(8) e.g., *(1) Salesforce is a digital product platform with the challenge of integrating complements into a unified product; (4) Spotify is a content distributor platform that configures its offerings for growth in users on different devices*
Per-platform competitive front	Coherent strategy	Decide where to participate and what to own in a given ecosystem and determine where the main opportunities and threats across the platforms are	Primary: (2)(5) Secondary: (1)(3)(6)(7)(8) e.g., *(5) Dr. Oetker is a traditional firm that adds value through information services offered across platforms; (2) Telcocorp configures its platform ecosystem to create complementarities and related new value-added services for different stakeholders*
Pre-platform competitive front	Vulnerability to platform competition Leverage of common resource	What are the information problems, level of modularization (and reconfiguration) and unmet customer needs that will provide opportunities for platform creation When and how to participate in open source development vs. purchased, customized or indigenous development in your service stack	Primary: (7)(8) e.g., *new entrants like Google and Android opted for platform commons strategy, in contrast to former competitors like Nokia*

calls for careful decisions on how to allocate resources, what to open and what to close and where to innovate.

For complementors, intraplatform competition coincides with the management of per-platform competition, which, in turn, affects the overall interplatform competition. The challenge for owners is integrating complementors to ensure uniformity while also providing incentives for platform participation. For complementors, the main concern is how to balance the trade-offs associated with participating on other platforms. In both situations, the issue is how to devise flexible relationships and strategies that allow for the effective treatment of factors and help balance the trade-offs between a sufficient breadth of complementors and the potentially distorting effect of having too much variety (range effects). Both platform and complementor firms need to consider how to harvest the benefits of deeper vertical relationships while avoiding limiting opportunities for expansion in other settings (reach/range effects). To this end, firms need to build capabilities to modularize their service

offerings in ways that help balance trade-offs at the service stack level.

At the per-platform level of competition, the critical factor is how to maintain a coherent strategy across multiple competitive fronts while investing in the service stack. The trade-offs cover decisions regarding full platform ownership (or which platform components to own) and participating on a select set of platforms while avoiding fragmenting offerings and making business ecosystem orchestration too complex. At the level of pre-platform competition, the critical factor is how to manage dependencies and essential resources in the service stack. This calls for a diligent analysis of what to own, how to manage dependencies between components and services, which platform components to own or not own, and how to avoid fragmentation by maintaining coherence in technology choices. Also, all companies need to be prepared for being a disrupter or being potentially disrupted by new platform competition.

Competitive Strategy: Resolving Tensions

The richness of the cases and the specific character of the competitive situations covered suggest that there are few "general" rules on how firms can effectively engage across all competitive fronts. The idiosyncrasy of each front also makes it challenging to identify a common set of critical factors and an associated boilerplate logic. However, in assessing the cases, it became apparent that any competitive strategy will need to attend to and resolve several competitive "tensions" that both platform owners and participants face. Below, we identify 11 tensions that were gleaned from the articles for further analysis and resolution in terms of each competitive situation encountered on platforms. These tensions represent fertile opportunities for future practice-oriented research.

1. **Tension:** clarity vs. fragmentation of offerings

If you are a platform offering a digital service and you need to leverage complementors, then it is essential to integrate the complementors effectively into a clear offering that manages competition between core and periphery products.

2. **Tension:** reach vs. coherence of offerings

If you are a platform participating on multiple platforms, then it is important to examine the reach to different customer segments against the coherence (uniformity) of the offering.

3. **Tension:** openness vs. proprietary nature of platform/resources

If you are a platform owner, how "open" do you want the platform to be, where openness stimulates participation at the cost of distinctiveness or proprietary relationships or control of resources.

4. **Tension:** broad vs. tailored offerings

If you deeply engage (as a platform or a complementor) with customers on their problem, then it is critical to examine whether and how it might limit opportunities for broader solutions for a larger customer base

5. **Tension:** engagement with platform vs. multihoming

If you are a complementor offering digital services, you need to decide how deeply to integrate with the platform (or establish exclusivity arrangements) at the cost of multihoming and expanding the reach of your offering.

6. **Tension:** loose vs. tight coupling of resources

If you are a platform, coupling between digital resources on the platform is important—where looser coupling (more interface flexibility) offers opportunities to pivot while tighter coupling promotes efficient processes.

7. **Tension:** configuration of capabilities vs. expediency to compete

If you are a platform facing a rapidly changing competitive environment with different target markets, it is important to prioritize the markets and expediently build/configure the requisite capabilities to compete.

8. **Tension:** status quo vs. disruption

If you are a traditional incumbent, it is important to determine whether your competitive environment has information problems, your offering can be modularized, and your customers have unmet needs, to see whether you are vulnerable to platform-driven disruption.

9. **Tension:** supply side vs. demand side

If you are a platform then it is important to provide the right incentive structure to expand your customer value proposition (supply side) while correspondingly engaging with and expanding the customer base through a wider range of services (demand side).

10. **Tension:** reach vs. identity

If you are a platform, it is useful to consider how you can modularize or configure your offerings to participate in other platforms without losing your identity.

11. **Tension:** expediency vs. dependency

If you are building a platform, it is important to consider whether off-the-shelf solutions can accelerate deployment and competitiveness or whether these solutions create unhealthy dependencies.

It is important to note that these 11 tensions need to be read as "sensitizing" probes. By interrogating the situation through the lens of each tension, one can orient, analyze and understand specific competitive situations better within each competitive front. During such probes, each tension can be contextualized and assessed in terms of competitive trade-offs between costs and benefits and can then inform the formulation of the competitive strategy. The actual manifestation of each tension and its resolution is likely to play out in manifold ways. Hence, any sensible logic for platform competition calls for contextual sensitivity, flexibility and adaptation. It demands conceptual means and managerial practices to simplify the complexity regarding key dimensions that matter for the decision situation. Learning by doing, building capacities to learn from experience and learning fast are critical dynamic capabilities that characterize platform competition.

Concluding Comments

This special issue is, to our knowledge, the first that focuses directly on platform competition. Through a rich and diverse set of practice-oriented research articles, it clearly reveals the excess complexity of competing with or on platforms. We suspect that the nascent domain of platform competition will likely push us to rework most of our canons of strategy and competition over the next several years and call for a careful reanalysis of what a *fully digital strategy* for a firm in a given setting means, in contrast to older notions of business strategy that relied on concepts and foundations of industrial organization, pipes and fixed resources. The primary question driving this work is: How can firms effectively compete in emerging and fluctuating multidimensional platformed landscapes? Secondary questions revolve around the tensions identified in this paper and their resolution. In this regard, platform competition forms a burgeoning, highly complex, largely untried space for research and practice. At the same time, addressing such questions will have life and death implications for many organizations.

Prior concepts for analyzing competition still apply. But they need to be completely rethought for the platform environment. For instance, principles of scale and scope economies apply but their meaning needs to be articulated anew, as the economic foundations, costs and risks of digitally mediated platform competition are essentially different. Notions of valuable, rare, inimitable and nonsubstitutable (VRIN) resource pools and their configurations still apply but the sources of value, the factors determining rarity, and the elements that are inimitable and non-substitutable are radically different. Moreover, the staying power of each of the elements in the new competitive landscape is short and fleeting since, in a digital context, most of them are software and data based. Notions of dynamic capabilities apply, but we currently have little understanding of what such capabilities might be for each competitive front and especially for their flexible firm-level coordination.

Finally, firms continue to face high levels of technological uncertainty and disruption. This change parallels what mobile computing, 4G networks and the cloud did for the creation of firms like AirBnB and Uber, which followed on firms like Amazon, Apple and Google, which were created during the period of e-commerce and the diffusion of the internet service stack. In the coming decade, we will see changes that could fundamentally shape how the physical layer (e.g., sensors/robotics), the network layer (5G), and the content and service layers using so-called Web 3.0 technologies (new cloud-based data services, AI, block-chain) will be configured. New unexpected forms and arrangements of platform competition are likely to emerge, such as continuous AI-based service configurations, new forms of algorithmic control that enable multimodal participant interactions, or new distributed forms of platform governance. What we have seen thus far is likely the tip of the iceberg regarding forms of platform competition.

Therefore, continuing to accumulate important in-depth cases that add to our understanding of types of platforms, the competitive fronts and their associated tensions, trade-offs and challenges is critically important if we are to develop robust prescriptions for platform competition.

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