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Platform Scope and Value Creation in Digital Platforms

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Abstract

Digital platform ecosystems are at the core of value creation in the digital era and a vital part of the digital strategy of firms. The generative nature of digital technologies makes it difficult for a platform sponsor to conceptualize and produce all potential product variations. Hence, co-creating value with autonomous third-party complementors is imperative. However, platform sponsors face unique uncertainties in enabling such value co-creation as often both the complementors and their value-enhancing complements are unknown ex-ante. We demonstrate how platform scope, encompassing three elements – platform technology, sponsor, and market scope, helps the platform sponsor manage uncertainties in value co-creation by attracting the right set of complementors and fostering a predictable set of complements. We discuss the implications of the scope choices for value co-creation and digital strategy of firms and highlight key areas for future research.

Keywords: platform scope, digital platforms, value creation, digital strategy, firm boundaries

Introduction

In recent years, digital technologies have rapidly proliferated, bringing fundamental changes to how firms create and capture value, collaborate, and compete. Digital artifacts built using such technologies are generative as they continuously evolve through reuse, extension, and modification by multiple actors simultaneously with minimal coordination (Cennamo & Santaló, 2019; Zittrain, 2005). Often, at the core of such value co-creation are digital platform-based ecosystems (hereafter referred to as platform ecosystems or ecosystems) that serve both as a central digital infrastructure to support co-creation as well as an organizational form to govern the actors involved (Jacobides et al., 2018; McIntyre et al., 2020; McIntyre & Srinivasan, 2017). Consequently, managing value co-creation in digital platform ecosystems is a vital facet of firm strategy in the digital era (Adner et al., 2019).

Digital platform ecosystems comprise a group of autonomous actors, called complementors, organized around the central digital platform infrastructure to co-create value with the platform sponsor (Chen et al., 2021; Kretschmer et al., 2020; McIntyre & Srinivasan, 2017). The digital platform sponsor faces two types of uncertainties (Tajedin et al., 2019) in co-creating value: First, being attracted rather than selected to participate in the ecosystem, the complementors are often ex-ante unknown to the platform sponsor; and second, the complements developed by the complementors are also ex-ante unknown. These two uncertainties have implications for value co-creation in the ecosystem as they shape the platform infrastructure design and ecosystem governance, modalities to secure commitment and cooperation of complementors for value co-creation, as well as the value proposition and identity of the digital platform ecosystem itself.

This chapter aims to understand how the platform sponsor's choices of *platform scope* help manage the uncertainties of ex-ante unknown complementors and complements and shape value co-creation in the platform ecosystem. The scope of the platform is a crucial tool to manage the two types of uncertainties as it signals value co-creation opportunities (Chen et al., 2021; Murthy & Madhok, 2021), defines complementors' access to shared resources for co-creation (Boudreau, 2010, 2017), shapes the platform sponsor's latitude to govern the ecosystem (Boudreau, 2017; McIntyre et al., 2020), and defines the market identity of the platform ecosystem (Cennamo, 2021). The value co-creation process begins with the platform sponsor, as the initiator of the ecosystem,

choosing the product and market space in which to compete as well as choosing to perform parts of the value creation process while opening the rest to the complementors. In essence, such a choice represents the platform scope, this being a key element of digital strategy as it plays a vital role in attracting and fostering external actors' participation and governing value co-creation within the ecosystem.

Platform scope constitutes technology, governance, and competition elements. Across the three streams of platform literature – technology management, economics, and strategy – we find three distinct conceptualizations of the scope of the platform: platform technology scope, platform sponsor scope, and platform market scope (Boudreau, 2017; McIntyre et al., 2020). The platform technology scope defines the platform components available to complementors. The technology boundaries enable and at the same time limit the complementors' innovation (Boudreau, 2012; Boudreau & Jeppesen, 2015; Boudreau & Lakhani, 2015). In contrast, the platform sponsor scope constitutes the choice of activities to be performed by the platform sponsor vis-à-vis the complementors, assets owned, and the actors' extent of control (Boudreau, 2017; Gawer, 2020). Finally, platform market scope is the choice of products and markets that the platform ecosystem serves through its offerings (Cennamo, 2021). Whereas platform technology scope and platform sponsor scope relate to the internal scope choice of the actors' boundaries within the ecosystem, the platform market scope refers to the external scope choice of products and markets in which the firm chooses to compete.

The choice of scope has key implications for value creation in ecosystems and the digital strategy of the actors. For instance, a choice of the platform sponsor to retain a broad scope would potentially make the technological interfaces less open, thereby allowing better control over critical assets and, therefore, more levers for platform governance (for example, a broad scope Apple ecosystem as compared to a narrow scope Android ecosystem of smartphones). However, such a choice of broad scope would mean that consumer utility would depend more on benefits accrued from the platform sponsor offerings. From the above example, it is evident that platform scope choices shape value co-creation within the ecosystem and the digital strategies of the actors involved.

This chapter contributes to the digital strategy, platforms, and firm scope literature. In identifying the unique challenges of value co-creation in digital platforms, where platform scope is an integral aspect of the digital strategy of firms, we show how and why the platform sponsor's choice of boundaries vis-a-vis co-creating complementors and rivals is a critical strategic choice. Our analysis depicts platform scope as both similar to and yet distinct from extant notions of firm scope, warranting attention from researchers and practitioners. Through our discussion of scope, we identify several areas for future research that can help us better understand the phenomena of digital platforms.

In the following sections, we provide an overview of the current state of research on the topic of platform scope, encompassing technology, sponsor, and market scope. We summarize the importance of the scope choice for digital strategy and value creation in platform ecosystems. In doing so, the chapter establishes platform technology and market scope as explicit choices and platform sponsor scope as a tacit boundary choice that shapes the ecosystem of actors around the digital platform. We conclude by highlighting the most salient areas to be addressed in future research on platform scope for a better understanding of digital strategy.

Digital Strategy and Value Creation in Digital Platform Ecosystems

Digitalization and Platform Ecosystems

Digital technologies encompass digitalized resources, assets, and information, that together enable building modular digital artifacts which can be recombined into different end-products (Baldwin & Clark, 2000; Lusch & Nambisan, 2015). Digital artifacts are generative (Zittrain, 2005) in that they can be reused, modified, and extended by multiple actors simultaneously with minimal coordination and “continue to evolve in terms of their uses and functionalities depending on how they connect and integrate to other products and services” (Cennamo, 2021, p. 268; Yoo et al., 2010). Digitalization underscores a shift towards the digital representation of information, increased connectivity between multiple actors, and the ability to aggregate disjointed data (Adner et al., 2019). Whereas the generative nature of digital technologies drives innovation in end-products and value propositions, digitalized information and data aggregation enhance ease of costless connectivity and effective interaction between actors. For example, although generative smartphone operating systems support the development of millions of apps, insights from data

aggregation are key to drive adoption as they enable the platform sponsor to connect the right apps with the consumers based on their preferences and usage behavior.

Digitalization has brought transformative processes that have resulted in fundamental shifts in how value is created. In essence, digitalization has enabled a shift in the locus of value creation from the core of the focal firm to co-creation with autonomous external actors. Since digital artifacts are perpetually in the making, the mere possibilities of combinations of the modular technologies make it impossible for a single firm to conceptualize and perform all the variations in-house. Thus, the focal firm seeks to leverage the distributed assets of external actors to perform variations of the underlying modular digital technologies. Often, a central infrastructure in the form of a digital platform, comprising core modules from the focal firm, is vital to foster building variations of the modules or value-enhancing complements. Platform sponsors leverage an ecosystem of autonomous external actors, called complementors, to co-create value without direct hierarchical control (Jacobides et al., 2018). The platform sponsors coordinate and organize the core offerings and complements into coherent value propositions through the digital platforms. Moreover, digital platforms serve as the “data hub channeling and integrating information from or to users and from or to multiple connected products and services” (Cennamo, 2021, p. 268). Hence, digital platforms are increasingly a core part of the digital strategy of the firm.

Value Creation in Digital Platform Ecosystems

Whereas digital platform ecosystems offer the advantage of value co-creation, they also present two uncertainties for value creation – ex-ante unknown complementors and ex-ante unknown complements (Tajedin et al., 2019). Firstly, a digital platform infrastructure supports the independent production of value-enhancing complements through the extension of core modules without impacting the core itself (Cennamo & Santaló, 2019). This results in the development of an ecosystem of complementors and their products around the core platform (Gawer, 2014; McIntyre & Srinivasan, 2017). The complementors are free to produce their own products by leveraging the core platform and its open interfaces (Gawer, 2014; Tiwana et al., 2010). With this arrangement, multiple value propositions are possible (Dattée et al., 2018) when the consumer selects from competing complements and combines them with the platform offerings. However, and crucially, this arrangement implies that the platform sponsor does not know ex-ante *which*

complements would be produced around the platform. Secondly, the platform sponsor is unaware of the potential complementors for the platform. Modularity and open interfaces to the platform infrastructure mean that the platform modules are available to complementors to the extent that it is made available by the sponsor. Since no explicit agreement is required to begin producing complements, the platform sponsor has little knowledge of *which complementors* might potentially produce the complements. Thus, the platform sponsors face dual uncertainties in value co-creation in the ecosystems owing to ex-ante unknown complementors producing ex-ante unknown complements.

The uncertainties of ex-ante unknown complementors and their complements have multiple implications for value co-creation in the ecosystem: first, the platform sponsor's design of the platform infrastructure and governance of the ecosystem should attract the participation of the ex-ante unknown complementors. Thus, the platform design and governance are crucial to value creation by the complementors and value appropriation for all the actors involved. Second, the platform sponsor must secure the commitment and cooperation of ex-ante unknown complementors for value co-creation without invoking formal customized contracts or hierarchical control. Thereafter, the platform sponsor can govern the value co-creation process with only indirect and informal authority (Chen et al., 2021). Third, the platform sponsor has to manage ex-ante unknown complements available on the platform for a coherent value proposition as well as nurture the 'health' and identity of the ecosystem on an ongoing basis all through the ecosystem lifecycle (Adner, 2017; Cennamo, 2021). In a nutshell, the two uncertainties bring novel challenges at different stages of the value co-creation process –attracting complementors, co-creating value with them, and governing the ecosystem.

The uncertainties of ex-ante unknown complementors and complements for value co-creation manifests similarly across both innovation and transaction types of platform ecosystems. The uncertainty from ex-ante unknown complementors and the importance of attracting the 'right' complementors is crucial for both types of platform ecosystems. The uncertainty from ex-ante unknown complements is more evident in the innovation ecosystems, yet still important for transaction ecosystems. For instance, the innovation platform sponsor should consider the extent of interface openness to selectively support certain types of complements. Similarly, the transaction platform sponsor should consider platform design choices that support only certain

types of transactions. Thus, with appropriate modifications, the arguments advanced in this chapter apply to both the innovation and transaction platform ecosystems.

As we detail in the following section, platform scope is a crucial tool available to platform sponsors to manage the uncertainties and enable value co-creation.

Digital Platform Scope

The scope of the firm and its impact on firm performance has long been considered a key issue in strategic management research (Ahuja & Novelli, 2017; Conner, 1991; Rumelt et al., 1991). The choice of firm scope shapes firms' strategies, the likelihood of survival, performance outcomes, and its competitive environment (Zenger et al., 2011). In digital platform ecosystems, the notion of platform scope has multiple dimensions and key implications for value creation and capture as well as for competition. The three streams of platform literature – technology management, economics, and strategic management perspectives (McIntyre & Srinivasan, 2017) – depict three distinct conceptualizations of platform scope that we term as *platform technology scope*, *platform sponsor scope*, and *platform market scope*. As detailed below, although the issue of platform scope has been addressed in each of the streams of the platform literature, their treatment of the topics has largely remained rooted in their respective foci.

Platform Technology Scope

The technology management stream of the platform literature has focused on the technological and architectural aspects of the platform and their implications for the ecosystem. Broadly, in this stream of literature, *platform technology scope* refers to the platform technology components made available to complementors through the platform sponsor's design choices. Platform technology scope choices shape the complementors' participation decisions (Boudreau, 2012; Boudreau & Jeppesen, 2015; Boudreau & Lakhani, 2015) as well as the ability of the platform sponsor to govern the platform ecosystem for value creation and capture (Gawer, 2014; Tiwana, 2008; Tiwana et al., 2010). The platform technology scope encompasses platform technology design choices such as modularity, interface openness, and software development kits (SDKs). Next, we discuss the above design choices and their implications for value co-creation in platform ecosystems.

The modularity of the platform infrastructure refers to a decoupled architecture of the core platform components to enable independent development of complements that do not interfere with the core or other complements and yet function as a whole (Baldwin & Clark, 2000; Tiwana, 2008). The interfaces to the platform core components may be opened to allow the complementors to access and build complements over the core components. A narrow platform technology scope manifested through a modular platform architecture and more open interfaces improve complementors' innovation (Boudreau, 2010, 2017). In contrast, a narrow platform technology scope defined by a less modular platform architecture and more closed interfaces help the platform sponsor better control and capture value (Chen et al., 2021). For example, Twitter's open interfaces attracted complementors who built apps that served as a front end for Twitter's consumers. Although these apps attracted consumers, they restricted Twitter's ability to monetize through advertisements as consumers using the app no longer visited Twitter's application directly. Hence, in 2012, Twitter began restricting its interfaces that eventually forced consumers to use the platform through its own front-end. However, the closing of the interfaces meant that several complements to the platform would no longer be available.

Platform sponsors offer software development kits (SDKs) to help complementors access the platform technology to design, develop, debug and publish complements (Chen et al., 2021; Eaton et al., 2015). Although SDKs are an incentive to attract complementors to the platform ecosystem, they often result in platform-specific investments that lock in the complementors to the focal ecosystem and reduce the compatibility of the complements with rival platform ecosystems. Overall, by sharing the platform resources through SDKs and APIs (Chen et al., 2021), the platform sponsor chooses a more fluid technology boundary with the complementors, and therefore a narrow platform technology scope that promotes innovation in complements.

In sum, the platform technology scope shapes the opportunities available to complementors for value co-creation by architecturally restricting access to platform technology components, interfaces, data, and algorithms. In doing so, the platform technology scope helps the platform sponsor address the uncertainties of value co-creation from ex-ante unknown complementors and complements. The platform sponsor can selectively open parts of the core platform modules, interfaces, and data such that they support the development of certain types of complements. Such a strategy may also be informed by the data generated and algorithms within the ecosystem.

However, though critical, the technology scope does not suffice in and of itself and is supported by other pillars, such as platform sponsor scope.

Platform Sponsor Scope

The success of a platform ecosystem is attributed to the potential of the platform sponsors and complementors to co-create value (Kapoor, 2018), with each actor performing different parts of the value co-creation process. Accordingly, the actor that performs a focal process retains control over the corresponding part of value creation. Such an arrangement begins with the platform sponsor, as the initiator of the ecosystem, choosing to perform parts of the value creation process while opening the rest to the complementors. In essence, platform sponsors choose their scope in the value creation process vis-à-vis the complementors, a choice that we term as *platform sponsor scope*. The choice of platform sponsor scope complements that of platform technology scope. As McIntyre et al. (2020) rightly point out, “while technology choices on platform design and interfaces have an influence on complementors’ incentives to innovate, and can affect to some extent complementors’ capability, they constitute only one of the levers of action that platform owners can manipulate. The scope of the platform [sponsor] is another lever of action” (McIntyre et al., 2020, p. 19; in parentheses added). As we detail below, the strategy stream of platform literature has multiple treatments of platform sponsor scope that address key aspects of the digital strategy of the firm.

Researchers have termed the platform sponsor scope as one of the key choices made at the outset as well as continually (Gawer, 2011; Gawer & Cusumano, 2008; Kapoor & Lee, 2013). As Gawer & Cusumano (2002, p. 9) emphasize, the choice of platform sponsor scope is “not a one-time event because firms innovate continuously on their products and add new functionalities that may well have been performed previously by external firms” (p.9). Early studies considered platform sponsor scope as the choice of complements to make internally as opposed to those left to complementors (Gawer, 2011; Gawer & Cusumano, 2008). In this treatment, a broad platform sponsor scope would depict a platform with several in-house complements, whereas a narrow scope would depict the availability of a wide range of third-party complements. Researchers have

demonstrated that platform sponsors make in-house complements to kickstart network effects¹ and fill the gaps that are not addressed by third-party complementors (Cennamo, 2018; Hagiu & Spulber, 2013). For example, video game console manufacturers produce a few games in-house to attract consumers to the platform, which in turn attracts game developers to produce third-party games for the platform. However, such in-house complements can only enhance the quality and variety of complements within the ecosystem before the market takes off (Cennamo, 2018).

Another mode of scope choice that enables the platform sponsor to redefine its boundaries is directly entering the complementors' product spaces (Wen & Zhu, 2019; Zhu & Liu, 2018). For example, Amazon as the platform sponsor expands its scope vis-à-vis the complementors when it competes within their product categories using its own products. Researchers have demonstrated that the platform sponsor enters complementors' successful product spaces, particularly those having less platform-specific investments (Zhu & Liu, 2018). Such scope expansion by the platform sponsor discourages complementors' participation or influences them to shift their innovation to a different product space within the ecosystem. The complementors' decision to shift their innovation efforts within the ecosystem to a different product space is seen in dominant platform ecosystems (Wen & Zhu, 2019). Thus, platform sponsor scope choice influences complementors' participation behavior and their performance outcomes.

Platform sponsor scope is addressed as a part of broader definitions such as the "vision that defines the ecosystem value proposition" (Dattée et al., 2018, p. 467; Iansiti & Levien, 2004) and an alignment structure comprising of actors, their activities, positions, and information flows that materialize the value proposition (Adner, 2017). Whereas the blueprint or vision of the ecosystem defines the value proposition, the associated alignment structure aims to identify the ecosystem design and governance. In this treatment, the platform sponsor's compelling vision of the ecosystem is vital to attract the participation of ecosystem actors. However, in situations of high uncertainty where such value propositions may not be effectively envisioned ex-ante, the platform

¹ Network effects is a condition where the value an actor derives from participating in a platform increases when a greater number of actors participate on the same side (termed direct network effects) or on other sides (termed indirect network effects) of the platform (Katz and Shapiro 1994; Rochet and Tirole 2003). Consequently, a large number of actors on one side can attract more actors to participate on the same or other sides of the platform. This dynamic results in a positive loopback such that more participation attracts even more actors.

sponsor scope choice evolves due to the collective discovery of the value propositions (Dattée et al., 2018).

In a more explicit treatment of boundaries, the platform sponsor scope is argued to comprise the assets owned, labor employed, and activities performed by the platform sponsor (Gawer, 2020). In this argument, platform sponsor scope is a key component of the digital strategy of firms and interacts with broader considerations such as the type of ecosystem and lifecycle stage. At a more granular level, platform sponsor scope comprises of: (i) the activities that the sponsor chooses to perform in-house while opening the others to complementors, and (ii) the sponsor's decision rights over complements (Murthy & Madhok, 2021). This treatment of platform sponsor scope encompasses prior conceptualizations as activities underpin the delivery of the value proposition and form a key part of the alignment structure. The scope choice signals the value creation and capture opportunities and consequently shapes the participation decisions of ecosystem actors. Further, the platform sponsor scope shapes the latitude that the sponsor has to govern the ecosystem. The platform sponsor has complete control of the activities it performs internally. Moreover, the platform sponsor can define governance rules for complementors and the broader ecosystem by defining who exerts decision rights over the complements.

In sum, the platform sponsor scope is a tacit boundary choice that signals to complementors opportunities for value creation and capture in the platform ecosystem. Thus, value creation in platform ecosystems involves not just direct but also indirect maneuvering by the platform sponsor, the lack of which may lead to the failure of ecosystems (Dattée et al., 2018; Tiwana, 2013; Tiwana & Konsynski, 2010).

Platform Market Scope

Another conceptualization of platform scope concerns economic forces and the external scope of markets and products in which the platform ecosystem competes. We term this conceptualization of scope choice as *platform market scope*. The platform market scope choice has implications for managing the uncertainties in value co-creation as it shapes the identity and value proposition of the platform ecosystem as a whole and consequently attracts and fosters the right set of complementors and consumers to the ecosystem. Platform market scope, rooted in the economics

stream of platform literature, is mostly addressed in relation to the product and market positioning of the platform ecosystem in relation to its competition (McIntyre et al., 2020). The dominant treatment here relates to the expansion of the market scope of the platform ecosystem and is often initiated by the platform sponsor. The platform market scope choice is a vital component of digital strategy as “firms that can capture and aggregate data from various sectors can unearth and exploit new kinds of synergies” to expand their scope of markets and products (Gawer, 2020, p. 6).

A platform sponsor may undertake platform market scope expansion to overcome entry barriers emerging from a rival’s network effects and enter their market. Such an entry may be accomplished by platform envelopment where the focal platform sponsor bundles the features of the rival platform into its own offerings and targets the overlapping user base (Eisenmann et al., 2011). This expansion mode harnesses common components and user relationships by leveraging demand-side and supply-side economies. Platform envelopment is beneficial to the envelopers as they gain market share by foreclosing the rival’s access to users and thereafter leveraging network effects to drive growth. By leveraging product bundling, the platform sponsor expands the markets addressed by the offerings of the platform ecosystem. A prominent example of this type of scope expansion is Microsoft bundling its Windows Media Player with the Windows operating system for personal computers. This scope expansion enveloped the offerings of the RealNetworks media platform (Eisenmann et al., 2011).

Yet another way of platform market scope expansion involves the focal platform sponsor acquiring potential rival platform ecosystems to “curtail the target’s innovation projects and pre-empt future competition” (Gawer, 2020, p. 6). Although this mode of market scope expansion is similar to non-digital firms, digital firms benefit from such acquisitions in terms of network effects and data aggregation from the target platform ecosystem. Facebook’s acquisition of Instagram and WhatsApp are examples of such platform market scope expansion by Facebook.

Additionally, platform market scope comprises of the decision to position as a niche or generalist platform ecosystem depending on whether they target specific groups of users or not (Seamans & Zhu, 2014). Platform market scope choice also shapes the distinctiveness of the platform ecosystem relative to its competition in terms of the type of complements and content available within the ecosystem (Cennamo, 2021; Cennamo & Santalo, 2013). Overall, the platform market

scope is a key component in creating a unique platform market identity of the ecosystem from the perspective of the users.

Integrated View of Digital Platform Scope

Platform technology, sponsor, and market scope are distinct conceptualizations about firm boundaries in the platform literature. In accordance with their origins and respective interests, the three streams of platform literature have examined issues related to platform scope in a partial manner. The focus of the technology stream of research has largely remained on issues related to platform technology scope rather than platform sponsor scope. The economics stream of research on platform scope has focused on platform market scope, its expansion, and implications on competitive interaction but not on organizational and governance issues. Finally, the strategy stream of research has focused on the governance implications of the boundary between platform sponsors and complementors.

Yet, although they seem distinct choices and encompass different considerations, the three interact to influence the broader digital strategy and value co-creation. As Boudreau (2017) highlights, technology and platform sponsor boundaries vary distinctly but interact with each other to influence organizational and governance issues. Through an exhaustive literature review, Chen et al. (2021) argue that several elements of platform sponsor scope determine the design elements of platform technology scope. The platform sponsor establishes access control to determine to what extent complementors can join the platform ecosystem (an element of platform sponsor scope choice) by technologically restricting the use of boundary resources and platform interfaces (an element of platform technology scope). Another example from Chen et al. (2021) of the interaction between the scope choices relates to the platform sponsor requiring the use of their own SDKs to develop complements (an element of platform technology scope) and thereby reducing the compatibility of the complements with other rival platforms (an element of platform market scope).

Furthermore, in the digital context, the platform technology scope includes the boundaries in terms of ownership and access to transaction and user data as well as algorithms for analytics and governance. Digital platform ecosystems generate data about the actors involved in the form of

reputation scores, ratings, reviews, interactions, and transactions among the actors (Alaimo & Aaltonen, 2021; Ritala & Karhu, 2021). However, the accumulated data often rests within the boundaries of the platform sponsor (Clough & Wu, 2020). Such accumulated data coupled with artificial intelligence algorithms can create data network effects that drive participation and, therefore, value co-creation within the ecosystem (Adner et al., 2019). In this context, the platform technology scope choice encompasses the design choice of the extent to which the platform sponsor shares data and analytics with the complementors. However, as Chen et al. (2021) posit, such technology scope choices should be made in tandem with the sponsor scope choices that in turn shape governance within the ecosystem. Despite providing a mapping of the platform technology and governance mechanisms, Chen et al. (2021) highlight that the implications of these choices on value co-creation are not fully understood. For example, there is debate on who captures the value created by harnessing these digital resources. On the one hand, as the owner of the data, the platform sponsor has a significant advantage in capturing such value (Clough & Wu, 2020). On the other hand, data sharing agreements and open platform interfaces are argued to offset such advantages (Gregory et al., 2021). Hence, the implications of technology scope choices in terms of data and algorithms and implications for platform sponsor scope are not fully understood, prompting calls for future research in this area.

In a recent effort to connect the seemingly separate but interdependent platform scope choices, Gawer (2020) considered the interaction between platform sponsor scope, platform sides, and interfaces and argued that these scope decisions are interdependent and need to be coherent for a successful digital strategy. From our perspective in this chapter, the ‘platform sides’ may be viewed as one of the elements of platform market scope as it relates to pricing and network effects. Similarly, interfaces form one of the elements of platform technology scope. Although an important first step, this study does not consider the different underlying elements of platform technology and market scope, the governance implications of the scope choices, and the interaction between them. To emphasize the essential point, an integrated understanding of the implications of technology, sponsor, and market scope choices on value co-creation is necessary to better understand the phenomena. Thus, in the following sections, we discuss the implications of the scope choices on the broader digital strategy of firms and then highlight key areas for future research.

Implications for Digital Strategy

So far, we have provided an overview of the important role of digital platforms and platform scope in the digital strategy of firms. We now discuss the implications of digital platform scope for our extant understanding of the firm scope and value creation.

Digital Strategy and Firm Scope. The scope of the firm has long been a central issue of strategic management as scholars have demonstrated its influence on key performance outcomes (Zenger et al., 2011). The conceptualization of digital platform scope differs from the firm scope literature involving hierarchical firms and hybrid arrangements like alliances. Platform technology and sponsor scope involve the choice of boundaries vis-à-vis the complementors who form an integral part of value co-creation in the ecosystem. These choices are similar and yet distinct to the traditional notion of firm scope. For instance, the conceptualization of platform sponsor scope as the choice of in-house complements vis-à-vis third-party complements is close to the make vs. ally argument that has underpinned much of the scope of the firm literature in traditional firms (Parmigiani & Mitchell, 2009; Parmigiani & Rivera-Santos, 2011; Shi et al., 2012). Yet, platform technology and sponsor scope choices differ from those of a traditional firm where the relationship between the actors involved is often arm's length or transactional. This is because the platform ecosystems encompass an arrangement of interdependence. At the same time, the boundaries are distinct from those in hybrid organizational forms like alliances because the platform sponsor, as the focal economic actor, neither selects its partners nor establishes complex contracts involving firm scope.

Platform market scope is an external scope choice that is similar yet distinct to the scope choice of traditional firms in terms of products and markets to compete in. With fungible digital assets enabling easy entry into new markets and network effects helping to leverage economies of scale and scope, the boundaries between different products, markets, and industries is less rigid (Adner et al., 2019; Gregory et al., 2021). For example, Amazon that began as an e-commerce platform, soon leveraged its digital infrastructure of data centers to enter the cloud computing market. As Adner et al. (2019) highlight, the “extreme fungibility [of digital assets] suggests that traditional notions of relatedness” in a focal firm's choice of products and markets to compete needs to be revisited.

Overall, whereas platform technology and market scope are explicit choices that shape innovation and market identity, respectively, platform sponsor scope is a tacit boundary choice that shapes the ecosystem of actors around the platform. Thus, digital platform scope is a key element of digital strategy and a distinct kind of firm scope that is important for value creation in platform ecosystems.

Value Creation under Uncertainty. A fundamental challenge for firms crafting their digital strategy is the unique value creation challenge where the focal actor — platform sponsor in the case of a digital platform ecosystem — co-creates value with complementors but does not know ex-ante who are the complementors or what their products may be. Digital platform ecosystems are argued to alleviate such uncertainties by the platform sponsor leveraging the market process to harness distributed knowledge of external actors, which is augmented with the sponsor's knowledge and capability to create value (Tajedin et al., 2019).

Digital platform scope serves as a basis to further examine heterogeneity in firm-designed markets, something we do not yet fully understand (Tajedin et al., 2019), and their performance implications. Platform scope captures how platform sponsors navigate the uncertainties of ex-ante unknown complementors and complements to create value. The platform scope encompasses the platform sponsor's choice of value creation processes to perform internally while opening the other processes to complementors. It also involves the design choices of opening platform technology and data to complementors as well as the choice of products and markets to compete. Together, these choices serve as a tool to attract the *right* set of complementors. The choice of platform sponsor scope signals to complementors the opportunities available for value creation and capture, thereby attracting them to participate in the ecosystem. Importantly, it also shapes the sponsor's latitude to govern the ecosystem. The choice of platform market scope also aids in attracting the right complementors by making explicit the market identity of the platform ecosystems. The platform technology scope choice shapes how the complementors can leverage platform core modules and interfaces while indirectly restricting complements variability. Thus, the platform scope choices serve to foster a more *predictable* set of complements. Although the complementors can innovate within the boundaries defined by the platform scope choices, the variability in the type of complements is contingent on the scope choices. In other words, the heterogeneity in scope

choices manifest in the variability of complements. In a nutshell, the platform sponsor can overcome the uncertainties in value co-creation through their choice of scope to foster the right complementors and a predictable set of complements.

Directions for Future Research

Platform scope is a key component of digital and platform strategy. Although some of the underlying considerations discussed above have been extensively studied in the platform literature, the topic of platform scope itself has received scant attention. The few studies that have focused on the boundaries of the platform ecosystem have tended to limit their focus to the aspects of interest pertinent to the respective stream of literature. We provide several directions for future research that can contribute to this important topic of digital strategy.

Digital Strategy, Ecosystem Structure, and Dynamics. Digital platform ecosystems are at the core of the digital strategy of firms. Yet, it is not fully clear how the digital strategy takes shape alongside the structure and dynamics of the platform ecosystem. Scholars have extensively studied the role of ecosystem structure and governance in platform ecosystems. However, it is unclear how the different elements of structure and governance combine to shape value co-creation (Dushnitsky et al., 2020). This is particularly important because platform sponsors simultaneously choose the ecosystem structure and governance elements. Moreover, the digital strategy exemplified through the platform sponsor scope choice shapes the sponsor's latitude in ecosystem governance and the technology design of the platform ecosystem. Hence, it is vital to understand the interplay between platform ecosystems' structural elements and platform scope. Any such effort should also consider heterogeneity in platform ecosystems to better understand the antecedents of the scope choices and ecosystem structure.

Furthermore, it is also important to explore if and how platform scope choices impact the platform ecosystem dynamics. Much of the platform dynamics literature is based on the exhaustive examination of network effects. There is immense potential in understanding how the interactions between technology, sponsor, and market scope may impact the network effect dynamics. This line of research will be instrumental to building knowledge of scope choices alongside heterogeneity in user preferences. Recent studies (Jacobides et al., 2018; Tavalaei & Cennamo,

2020) have begun to shed light on the different types of complementarities and their implications for ecosystems. It would be vital to explore how scope choices interact with complementarities to shape the platform ecosystem structure and dynamics.

The notion of platform scope has implications for understanding digital strategy in terms of how focal actors can indirectly influence value co-creation with external actors. Future studies can examine how the scope choice interacts or influences broader digital strategies involving governance design choices in contexts other than digital platforms. This line of inquiry is also fruitful to examine how the scope choices of a dominant player may shape entrepreneurial opportunities within the ecosystem. Another aspect of scope involves the broader boundary choice of the focal actor vis-à-vis other firms within the same market. Whereas much of the literature in this stream has focused on competitive positioning, there is scope to examine how this boundary choice interacts with the internal scope choice discussed above. Such an inquiry is particularly important for digital strategy because autonomous co-creators such as complementors often engage in multihoming or co-creation in multiple platform ecosystems simultaneously.

Temporal dimension of Digital Strategy. Digital strategy, like other aspects of firm strategy, evolves over time and in response to changes in competition, complementors' behaviors, and environmental factors. Digital platform scope is a choice made at the outset and continually (Cusumano & Gawer, 2002; Gawer, 2011) and therefore a key element to study along the temporal dimension. Gawer (2020) highlights the importance of the lifecycle stage in the scope choice. A key point of departure in the platform lifecycle is the market tipping point beyond which winner-take-all dynamics result in the dominance of one or a few platforms and the inevitable failure of the rest. A platform sponsor prioritizes value co-creation before the market tips with the hope of attracting participation and winning the race for network effects. Hence, during this period, the sponsor chooses its scope in a way that enhances transactions and innovation within the ecosystem. In contrast, after the market tips, the platform sponsors prioritize value capture, having achieved the benefits of network effects. During this period, the platform sponsor chooses its scope to facilitate profitability and market dominance (Gawer, 2020).

Although a good start, there is immense potential in exploring how each of the scope choices around technology, sponsor, and market boundaries evolve over time. Moreover, it is essential to

understand if one or more of these elements of scope choices gain prominence at different stages of the lifecycle and the antecedents driving such selective importance of the scope elements. Such an examination should also consider how the scope choices co-evolve with the ecosystem structure and dynamics as well as the broader firm-level strategies of the platform sponsor. Furthermore, with the temporal dimension underexplored in the platform literature (Kretschmer et al., 2020), it is essential to empirically identify key lifecycle stages of the platform ecosystem from the perspective of digital strategy. Specifically, future research that can characterize specific lifecycle stages when data aggregation and digital assets bring transformative changes to the markets and industries would be of significant interest to policymakers and practitioners.

Complementors' Strategies and Digital Platform Scope. Although scholars have demonstrated that platform scope influences complementors' participation behavior, however with very few exceptions (Wen & Zhu, 2019; Zhu & Liu, 2018), we do not fully understand how complementors' strategies take shape in response to alternative scope choices. This is particularly relevant in contexts where complementors participate on multiple platforms with the same complements. In essence, this line of inquiry seeks to understand optimal scope choices and the relative importance of platform technology, sponsor, and market scope choices from the perspective of the complementors. Furthermore, as with much of the platform literature, there is huge potential to study the temporal dimension in this context. Specifically, understanding how complementors may respond to scope choices before and after the market tipping point is vital to understanding the power dynamics within the ecosystem. Such results will have implications for policymakers inclined to ensure a fair and competitive environment. Future studies can also examine the role of platform scope choice in shaping the ecosystem dynamics. A promising line of research involves exploring complementors' strategies such as entry timing, pricing, and quality of complements under different types of network effects and complementarities.

Digital Strategy and Corporate Strategy. With the growing importance of digital strategy, it is fundamental to understand how the broader firm-level strategies of the platform sponsor may interact with their digital strategy. One such important and potentially fruitful area of research relates to the interaction between the platform sponsor's corporate strategies and their digital strategy. Despite adopting the organizational logic of harnessing co-creation by autonomous complementors within their ecosystems, platform sponsors engage in alliances and joint ventures

much like a traditional firm and often simultaneously. Whereas platform scope, particularly the platform technology and sponsor scope, is a choice made vis-à-vis the complementors, there exists the possibility of selectively modifying platform scope through inter-organizational arrangements. Although platform sponsors leverage the complementors' intellectual property, resources, and knowledge through their complements, several examples show that platform sponsors also depend on alliance partners. For example, GE, as the platform sponsor, announced partnerships with several firms and launched a four-tiered partnership program in its effort to encourage the development of complementary products for its internet of things (IoT) platform, GE Predix, even as it offered open application programming interfaces (APIs) to its platform that the autonomous complementors can use to develop their products. Future studies can examine how the platform sponsor's corporate strategies interact with their scope choices and how these choices may shape complementors' strategies and overall ecosystem performance.

In conclusion, with the proliferation of digital technologies and the central role of platform ecosystems, it is important to explore different perspectives to enrich our understanding of the underlying elements and their manifestations. Notwithstanding the importance of technology and economics-based perspectives, novel considerations on digital platform ecosystems have raised new questions and provided opportunities to address ongoing debates not addressed by earlier work. This chapter, encompassing the notion of platform scope in informing digital strategy, is one such perspective that can trigger novel insights and has important managerial implications.

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