



# Multi-sided platforms

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## Introduction

Dear Readers,

Multi-sided platforms (MSPs) have been around for several centuries. Only recently, however, MSPs have become prominent in the economy, especially due to the internet and digitization wave across many industries. The idea behind MSPs is simple: they connect two or more interdependent user groups, by playing an intermediation or a matchmaking role (Gawer 2014; Evans and Schmalensee 2016). Thus, MSPs are tightly related to electronic markets; they actually show a progress in our current understanding of this phenomenon (Alt and Klein 2011), which denotes “all forms of networked business where multiple suppliers and customers interact for economic purposes within one or among multiple tiers in economic value chains” (Alt and Zimmermann 2014, p. 162). Note, however, that the concept of electronic markets has been around for several decades, even before the start of scientific research in this field and the inception of the Electronic Markets Journal in 1991.

There is a growing interest in MSPs in the scholarly literature (McIntyre and Srinivasan 2017). This is due to two key factors. First, platforms play an important role throughout the economy, as they minimize transactions costs between market sides (e.g. Hagiu 2006). Second, MSPs appear to be the most powerful business models in the digital economy due to their adaptability and ability to handle complexity, rapid scale-up, and value capture. Airbnb, eBay, Uber, Google, and Apple are spectacular success examples of MSPs. Such businesses have demonstrated remarkable growth and achieved high financial valuations. Nevertheless, despite many companies opting for MSP business models, to date only a few have been successful (Yoffie et al. 2019).

To be successful, MSPs should strive to attract users. The more users are active on the platform, the better, as the platform becomes more valuable for its users. Therefore, MSPs must achieve network effects. Their value increases, as they attract more users. When users from one side lead to more users on the same side joining the platform, this is called same-side or direct network effects (Rochet and Tirole 2003). For instance, direct network effects are at work when people looking for online social interactions join Facebook due to the growing number of users. The growth of the user base makes it more likely for new users to find friends and to engage in social relationships. However, when one market side attracts another side of the market such as sellers or developers of complementary products, this type of network is referred to as indirect or cross-side network effect (e.g. Täuscher and Abdelkafi 2018; Zhu and Iansiti 2012). For instance, advertisers or game developers get more interested in Facebook, as more users join the platform, because it enables them to achieve a broad reach of potential customers.

Network effects can be strong or weak, positive or negative. Strong and positive network effects lead companies to grow their base of users rapidly. Facebook, for instance, has more than 2 billion users today. Negative network effects generate a decline in

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the number of users, e.g. because of poor rating of the services or too much advertising (Cusumano et al. 2019).

The success of MSPs depends on several economic and technological factors (Gawer 2010). Intuitively, the value propositions offered to every side of the platform, the ease with which users can connect to it, and the platform's fundamental services are critical determinants of platform success. Whereas network effects are important, alone they do not lead to success. McAfee and Brynjolfsson (McAfee and Brynjolfsson 2017, p. 169) observe that winning platforms share several characteristics. They emerge early enough to leverage network effects, but they need not be first movers. They take advantage of the economics of complementary goods, open up the platforms to a wide range of contributors, while curating their platforms to minimize unpleasant surprises.

Beside these success factors, which comprise necessary, but not sufficient conditions, MSP research identifies many challenges facing MSP implementation (Eisenmann et al. 2006). For instance, getting the first set of users to affiliate with the platform is a key challenge for MSPs. In the presence of indirect network effects, users on one side join only when there are sufficient numbers and quality of users on the other side, leading to a situation where "no one joins until everyone joins." "Solving the chicken-or-egg-problem and then generating *strong* network effects can be very difficult if one side of the market realizes value only when another side is fully engaged" (Cusumano et al. 2019, p. 17–18).

This special issue aims at advancing state of the art knowledge of MSPs, thus contributing to a better understanding of the economic mechanisms and technological solutions propelling MSPs to succeed. The papers are classified into three main categories: (1) design, (2) dynamics, and (3) performance of MSPs. Whereas it is true that each paper may address more than one category, our classification rather reflects the area, which we believe the authors primarily attempt to

contribute to. Design relates to the technological architecture of the platform, the technologies (software and hardware) to make a platform function as well as platform governance elements, that is, the rules guiding the different sides of the platform. Dynamics refers to evolution of the platform and its development over time within its ecosystem by attracting users and adding new functionalities to the platform, while performance deals with the ability of the platform to succeed in competition (e.g. Zhao et al. 2019). Table 1 assigns the articles accepted for publication in this special issue to all three categories.

## MSP-definition

The term "platform" has been defined in different ways, depending on the context of usage. In the fields of business and engineering, Baldwin and Woodard (2009, p. 25) question, whether the "various platform concepts are synonymous or simply evocative uses of the same word to mean different things." They review three perspectives on platforms: product development, technology strategy, and industrial economics. They conclude that at the level of architecture all platforms are fundamentally the same and hence, propose a unified view of platform architecture. A platform architecture is "...a modularization that partitions the system into (1) a set of components whose design is stable and (2) a complementary set of components which are allowed – indeed encouraged – to vary. The combination of stability and variety is accomplished via 'stable, yet versatile' interfaces, which govern the interactions of components (Baldwin and Woodard 2009, p. 41).

Although they have the same architecture, platforms can be different with respect to their objectives and context of use. For instance, product platforms denote common components and subsystems to build families of related products. They have been used, e.g. in the automotive industry to reduce the costs of product development

**Table 1** Classification of the special issue papers with respect to design, dynamics and performance

Design	Dynamics	Performance
<ul style="list-style-type: none"> <li>• Otto B. and Jarke M.: Designing a multi-sided data platform: Findings from the international data spaces case</li> <li>• Fürstenau D., Auschra C., Klein S., and Gersch M.: A process perspective on platform design and management: Evidence from a digital platform in health care</li> <li>• Aulkemeier F., Iacob M., and van Hilleberg J.: Platform-based collaboration in digital ecosystems</li> </ul>	<ul style="list-style-type: none"> <li>• Poustchi K. and Gleiss A.: Surrounded by middlemen - How multi-sided platforms change the value network in the insurance industry</li> <li>• Hein A., Schrieck M., Wiesche M., Böhm M., and Krcmar H.: The emergence of native multi-sided platforms and their influence on incumbents</li> <li>• Täuscher K.: Uncertainty kills the long tail: Demand concentration in peer-to-peer marketplaces</li> </ul>	<ul style="list-style-type: none"> <li>• Koch J.-A. and Siering M.: The recipe of successful crowdfunding campaigns: An analysis of crowdfunding success factors and their interrelations</li> <li>• Choi K., Ryu S., and Cho D.: When a loss becomes a gain: Different effects of substitute versus complementary loss leaders in a multi-sided platform</li> <li>• Wallbach S., Coleman K., Elbert R., and Benlian A.: Multi-sided platform diffusion in competitive B2B networks: Inhibiting factors and their impact on network effects</li> </ul>

and accelerate the pace of innovation. However, platforms can characterize products, services, firms or institutions that mediate transactions between groups of agents (Baldwin and Woodard 2009; Rochet and Tirole 2003). They have emerged, in particular, in domains such as the personal computer (e.g. the Windows operating system platform by Microsoft, leading to software developers creating useful software compatible with Windows) and the internet (e.g. eBay, linking buyers and sellers).

Hagiu (2006, p. 3) asserts that “an MSP provides a support that facilitates interactions (or transactions) among the two or more constituents (sides) that it serves, such that members of one side are more likely to get on board the MSP when more members of another side do so.” Thus, in this definition the focus is on the transactional aspect of MSPs.

Software platforms (Evans and Schmalensee 2016) or industry platforms (Gawer and Cusumano 2002), however, go beyond this definition and include the innovation aspect of platforms. Thus, Platforms “...bring together individuals and organizations so they can innovate or interact in ways not otherwise possible, with the potential for nonlinear increases in utility and value” (Cusumano et al. 2019, p. 13).

Consequently, there are two basic types of platforms: innovation and transaction platforms. Innovation platforms “... consist of common technological building blocks that the owner and ecosystem partners can share in order to create new complementary products and services” (Cusumano et al. 2019, p. 18). These products and services developed by one side of the market add value to the platform, making it more useful. Microsoft Windows, Google Android and Apple iOS are computer operating systems that serve as innovation platforms.

Transaction platforms are quite different and have even emerged before the digital era. They act as online marketplaces between buyers and sellers to exchange goods and services or as intermediaries between two groups of users that get value through mutual interactions, e.g. by creating, sharing, and consuming content (e.g. Evans and Schmalensee 2016).

Some platforms link the two. Some companies start as transaction platforms and add innovation components to enable third parties to innovate, or start as an innovation platform and add transaction functions progressively (Cusumano et al. 2019). Thus, this special issue induces a broad understanding of MSPs: Innovation, transaction, and hybrid platforms.

## Design

The process applied to the design of a MSP is crucial for its success. There are several approaches to developing and setting up a MSP. Transaction platforms focus on the company’s perspective and are often designed in a classical way in the

sense that they are set up according to an idea, concept or certain requirements that result from a systematic, but rather closed analysis. In other words, the company that initiates and operates the platform ascertains platform functionalities that stakeholders who should be part of the MSP can use later on to contribute to the platform. (Open) Innovation platforms, however, follow a different design approach. The development of the platform itself and/or the running of the platform involve a multitude of beforehand unknown stakeholders that participate in the development process as well as in the further roll-out and implementation of the platform.

In the end, the way of initiating and developing a MSP as well as the purpose and stakeholder group targeted by the MSP, strongly influences the design of such MSP. Certain design principles can be applied and help to ensure the success of the platform and the intended purpose. One paper that is published in the general research track of this issue is strongly linked to this topic, as it offers design principles for establishing a multi-sided open innovation platform. The results in this paper are drawn from lessons learned from an action research study in the medical technology industry and then links to existing studies and research in general terms (Daiberl et al. 2019). For example, innovation platforms need to foster idea evolution (Majchrzak and Malhotra 2013), provide individual support for the participants throughout the open innovation process (Randhawa et al. 2017, 2018), and the platform management has to ensure compliance with regulations (Gatzweiler et al. 2017).

Additionally, the technological architecture, software, as well as platform governance aspects and rules are crucial for the design of MSP. However, generally valid design principles and criteria are scarce. Current research is rather focusing on certain industries, use cases or platform examples. Hence, more research on this topic is needed to enrich this body of knowledge, to gather a huge body of data on different industries and cases, and to create the foundation for more general insights and rules. In this special issue, several papers deal with criteria relevant for the design of MSPs in different cases.

## Dynamics

Consequent to the design of the platforms, it is important for us to understand how platforms interact with their user-groups and/or other complementors in the ecosystem, apart from competing with other firms. So far, the dynamics of platform businesses have been studied from three perspectives: (1) the effects of MSPs on markets and industry, (2) MSP evolution, and (3) competition among platforms.

MSPs can lead to fundamental changes in markets and industries. Recent studies show how platform businesses have impacted specific industry structures and market interactions (Gawer and Cusumano 2014; Bresnahan and Greenstein

1999; Patrucco 2014). For instance, platforms like Uber, Didi, and OLA (ride hailing firms) have changed entire urban transportation industries across the globe. By enabling transactions that were hitherto not possible (geolocating drivers and riders in real-time through a smartphone App), the ride-hailing platforms have allowed for removal of frictions in such transactions, as well as fulfil specific customer expectations. Another industry that has been significantly transformed by platforms is hospitality. Platforms like Airbnb have changed the boundaries of the hotel industry by enabling private homeowners to become hosts and provide unique value to travellers. However, only little research so far examined these changes at a generic ecosystem level.

With respect to MSP evolution, incumbents can grow platform businesses by following two different paths: either traditional product firms evolve as whole to platforms (Zhu and Furr 2016), thus leaving the product-focused business, or established firms create intrapreneurially, from within their organizations, new platform firms (Brusoni and Prencipe 2009). These created platforms then evolve hand-in-hand with their ecosystems. Tiwana et al. (2010) study the co-evolution of platforms and ecosystems and relate platform evolution and architecture to how platforms interact with their ecosystems. In addition, multi-sided platforms may also act as mediators or regulators within the ecosystems that they operate in (Boudreau and Hagiu 2009). For instance, platforms like the Apple AppStore and Spotify curate the content that flow through the platform from one side to another and regulate the behaviour of different user groups through a combination of price- and non-price incentives. By pricing an App at a very low price, the AppStore may increase its downloads, but also signals its relative utility to its users. By the specific order of search results, music streaming platforms may signal popularity of certain songs.

A lot of research has dealt with the competition of platforms with each other. Starting from Rochet and Tirole (2003), many studies have focused on recognizing patterns regarding how platforms organize their user interactions in specific markets (for instance, see Alt and Zimmermann 2019; Cennamo and Santalo 2013; Distaso et al. 2006; Chakravorti and Roson 2006; and Weeds 2015).

## Performance

In spite of the growing literature on platform dynamics, it is still not obvious how firms can achieve platform leadership. Cusumano and Gawer (2002) elucidated four levers of platform leadership: firm scope, technology design and intellectual property, external relations with complementors, and internal organization. Zhu and Iansiti (2007) have studied the outcomes of platform leadership – installed base, platform quality, or adding customer value, especially in combination

with platform performance metrics (size, quality, and network effects). However, there is a need for an integrative work that combines these metrics altogether and consider their relative impact of these on platform leadership.

The day-to-day ubiquity and stellar success of some platforms can be misleading – a platform business model is not a guarantee of economic success. Even if a platform per se is designed and operated well, it may well fail. Platforms are successful if they constitute a bottleneck in the industry architecture.

To understand the potential for a platform to become such a bottleneck, its industry-level environs need to be analyzed (see e.g. Pousttchi and Gleiss 2019). At least three sets of factors are important.

First, is the platform required or optional for value creation in its surrounding industry? If the platform itself offers a product or service that is a non-essential complement to the core offering in this industry, it is unlikely to capture much of the value created (Baldwin and Woodard 2009).

Second, what is the competitive situation at the platform level? Research (e.g. Cusumano et al. 2019) has studied competition at the platform level, uncovering factors such as multi-homing costs, preference heterogeneity and local networks to understand the likelihood of a winner-take-all outcome. All of these factors and likely some others will affect the performance of platforms in competition.

Third, who controls the platform and what are the likely repercussions for value capture? Platforms can exhibit various levels of openness, ranging from open interfaces to open source (Eisenmann et al. 2009). Platform openness will affect value creation, but also value capture. Fear of control by the owner of a closed platform can actually keep industry players from joining in the first place (as is observable with some blockchain projects right now that are led by single firms).

In net, a birds eye view on industry architecture and dynamics is required to understand the likely performance of a platform. The papers presented in this special issue can provide new guidance on these matters and help us better understand platform performance.

## Special issue papers

This special issue consists of nine papers that are classified into three categories: (1) Platform Design, (2) Platform Dynamics, and (3) Platform Performance.

### Design

Otto and Jarke (2019) introduce the International Data Spaces (IDS) initiative, a multi-sided platform (MSP) for secure and trusted data exchange, governed by an institutionalized alliance of different stakeholder organizations. The paper delivers

insights into the early stages of the platform's lifecycle, in other words the platform design process. More specifically, the authors provide answers to how alliance-driven MSPs come into existence and evolve, how different stakeholder groups use certain governance mechanisms during the platform design process, and how this process is influenced by regulatory instruments. The authors found that different evolutionary paths could be pursued during the early stages of an MSP's lifecycle.

Fürstenau et al. (2019) conduct a longitudinal case study on HSPC, a platform jointly established by a consortium led by multiple U.S. health care providers. The authors study the development processes of the platform over a period of five years and the underlying management decisions and design choices. They found distinct strategic choices that aim at scaling the platform and competitive positioning at an early stage of platform evolution as well as the challenges and conflicts that arise during this early stage.

Aulkemeier et al. (2019) observe that successful collaboration requires strong information technology support. In a business service network, the links between partners must enable quick connect and disconnect relationships, in order to harness market opportunities. Information technology platforms can enhance this quick connect capability. The authors rely on a design science approach to promote the concept of platform-based collaboration and propose an architecture for an inter-organizational platform that facilitates the provisioning of collaboration services. In addition, they present a prototype in the context of e-commerce as a means of evaluating the proposed design.

## Dynamics

Pousttchi and Gleiss (2019) investigate the game-changing impact of MSPs on traditional markets, in particular, how MSPs affect value creation and customer interaction, and how they leverage digital technologies to offer new value propositions. The authors conduct their research in the insurance industry. Based on a reference model of the value network for the insurance industry, they conduct a platform-focused case study to discover and analyze different roles of MSPs. These MSPs are categorized with regard to their relation to traditional insurance companies, resulting in a classification scheme with four MSP standard types: Competition, Coordination, Cooperation, and Collaboration.

Hein et al. (2019) observe that prior research focuses mainly on established MSPs and less on MSP emergence. By means of propositions derived from the literature, they argue that MSPs assimilate technologies in technological trajectories and create new demand, whereas incumbents do not follow those trajectories and because of the new demand eventually embark on a transformation process toward an MSP provider. A multiple-case study analysis in the context of mobility

services with three native MSP companies along with an incumbent that is transforming toward an MSP provider result in a process model showing that native MSPs follow a process of sense-making and bricolage to assemble a service-oriented architecture, whereas incumbents adopt technologies according to its institutional logic to improve existing products and processes.

Täuscher (2019) remarks that theory on the "Long tail effect" predicts that consumer demand in online markets spreads over a long tail of niche products, whereas recent research provides opposing evidence. Täuscher reconciles these opposing findings and propose that consumer uncertainty represents a hidden yet important boundary condition for the long tail effect. Under high uncertainty, demand will be much more concentrated as consumers disproportionately choose the most reputable producers and products. These arguments are developed to predict the demand concentration in peer-to-peer marketplaces, a context in which consumers face high uncertainties about their transaction partners. Testing these predictions with a self-collected dataset of 860,000 transactions on a peer-to-peer marketplace for skillsharing supports the hypotheses. Only a small portion of producers benefits from marketplace participation. These findings suggest that an opposing rich-get-richer effect overrides the long tail effect in peer-to-peer marketplaces.

## Performance

Koch and Siering (2019) define online crowdfunding websites as multi-sided platforms. The successful funding of crowdfunding campaigns is important for founders, investors, platform operators, and diverse interest groups. Building upon previous research on crowdfunding, investment decision making, and signaling theory, the authors propose a model that explains crowdfunding success considering success factors and their interrelations. The results are especially useful for the preparation and identification of successful project proposals.

In their study, Choi et al. (2019) examine the effect of the loss leader strategy on profitable products in a multi-sided platform. They assess different effects of loss leaders according to their substitute versus complementary associations with profitable products. The results suggest that the introduction of a substitute loss leader is negatively associated with the sales of profitable products, while complementary loss leaders have no significant effect on them. They also find that the impact of loss leaders can vary according to the price of related core projects.

Wallbach et al. (2019) deal, in their research, with MSP diffusion inhibitors in competitive B2B networks. Using the air cargo hub in Frankfurt, Germany, as highly competitive B2B network, which struggles with the acceptance of an MSP for over ten years, the authors apply grounded theory

approach to identify key inhibitors to MSP diffusion. 21 factors inhibiting MSP diffusion are identified. The majority of these factors slows down or even thwarts positive network effects. The inhibiting factors primarily hamper cross-side network effects in highly competitive B2B networks and to a lesser degree same-side and mixed-side network effects.

The papers in this special issue advance state-of-the-art research in multi-sided platforms. Nevertheless, still more research is required with respect to all three areas identified in this editorial: design, dynamics, and performance. Whereas it is far from realistic to find one day a formula that leads to successful platforms, research can support entrepreneurs and companies in seeing patterns of good practices and in learning from the failure and mistakes of other platforms. It also becomes clear that many contingencies can affect platform business and that platform performance is highly context-dependent. At the end, the launch of multi-sided platform is an entrepreneurial adventure that bears the traditional risks that come along with the creation of new ventures. Nevertheless, there are specific factors that entrepreneurs should consider to achieve good execution and contribute to wealth creation.

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