Platform Orchestration for Efficiency, Development and Innovation

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Abstract

Platform research has expanded from management of technology domains towards the service of a business. Any kind of venue – physical or virtual - enabling a one-sided, two-sided or multi-sided market can be thought of as a platform. Digital platforms compete against each other and some become successful while others fade away. Platform cannot be managed in a goal-oriented fashion because the number of actors and relationships between them increases beyond the ability of what the platform owner can handle. However, a platform can be orchestrated by designing and facilitating processes taking place among participants. In this conceptual paper, we review the literature on platforms and participant roles. We present four platform categories and three platform orchestration modes. In conclusion, we suggest that winning platform requires simultaneous orchestration of efficiency, development and innovation in order to attract and lock-in participants, facilitate transactions, and create novel offerings.

1. Introduction

Platforms have become a hot topic in business magazines and academia. This popularity is due in large part to mobile phones and the variety of services and products connected to them. When choosing a mobile phone and making an investment in hardware, the end user locks into a certain platform (e.g. iPhone or Android), and switching costs are relatively high due to initial investment. As hardware becomes commoditized and less pricey, the role of services and platform renewal increases in attracting and locking-in end users.

The basis for platform thinking comes from the information and communications technology (ICT) domain [1], [2]. Studies on technology platforms began with Intel and its microchips [3] that function as non-replaceable core technology for other devices and complementary technologies and services. Technology platforms are composed of onion-like multilayered structures in which the technological core element is necessary for complementary technologies that in turn provide ground for software.

Many different types of platforms have been identified based on the nature of interactions between participants. There are, for example, platforms that aim to help members of some participant group find a match in another group, platforms that bring sellers and buyers together, platforms that measure transactions between participants, and platforms where participants share their input with other participants [4], [5]. Platforms can also be categorized based on the number of firms who create the platform in the first place. These platform types are proprietary, licensing, joint venture and shared platforms [6].

Depending on the number of participating groups, platforms make a one-sided, two-sided or multi-sided market possible [5]. Furthermore, depending on whether complementors are free to integrate their offering into the platform without the platform owner specifically choosing the complementor, the platform can be either closed or open [c.f. 7].

Most often the offering for end users in the platforms are both services and products, and increasingly the consumption of the two are inseparable. This is the case, for example, with wearable devices that track people’s exercise habits and report analyzed data back to the end user via a mobile application, or GPS navigation devices that gather users’ traffic data to the platform and send it back to users to update the estimated time of arrival to the destination.

The platform offering is a bundle of multiple parts, and its utility and profitability can be analyzed [8]. Any physical or virtual space where different participants compose a market and a platform that participants orchestrate can be defined as a platform. For example the above-mentioned wearable devices and GPS navigators are one-sided platforms. Two-sided platforms include, for example, real estate portals, department stores, newspapers and magazines, network televisions and credit cards [4]. Multisided
Platforms include social media platforms and smartphone operating systems [9]. Table 1 presents examples of platforms.

In these platforms, the users connect to each other, communicate and co-create value for themselves and for the other users and participants. The user is no longer a passive recipient and object of value delivery, but active co-creator of value. This means that in order to fully benefit from platform offering, the end user must give something back to the platform.

**Table 1: Examples of platforms**

<table>
<thead>
<tr>
<th>Industry</th>
<th>Platform</th>
<th>Side One</th>
<th>Side Two + n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare</td>
<td>Wearable device</td>
<td>Fitness enthusiasts</td>
<td>N/A</td>
</tr>
<tr>
<td>Mapping</td>
<td>GPS navigator</td>
<td>Car driver</td>
<td>N/A</td>
</tr>
<tr>
<td>Real Estate</td>
<td>Real Estate portal</td>
<td>Seller of house</td>
<td>Buyer of house</td>
</tr>
<tr>
<td>Retail</td>
<td>Department stores</td>
<td>Small shops</td>
<td>Customers</td>
</tr>
<tr>
<td>Media</td>
<td>Newspapers and Magazines</td>
<td>Advertiser</td>
<td>Reader</td>
</tr>
<tr>
<td>Media</td>
<td>Network Television</td>
<td>Advertiser</td>
<td>Viewer</td>
</tr>
<tr>
<td>Payment card system</td>
<td>Credit cards</td>
<td>Merchant</td>
<td>Cardholder</td>
</tr>
<tr>
<td>Social Media</td>
<td>Social media platform</td>
<td>Users</td>
<td>Advertisers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Third-party game or content developers and third party sites</td>
</tr>
<tr>
<td>Smartphone</td>
<td>Operating system</td>
<td>Handset manufacturers</td>
<td>Users, Application developers</td>
</tr>
</tbody>
</table>

Platforms are transforming the way products and services are being consumed, and are radically changing the structures of economy and society. Popular examples of platforms that have created a multi-sided market around them include the social media platform Facebook, retail platform Amazon.com and Apple’s music platform iTunes. These platform owners have managed to attract and lock-in large numbers of participants, and are profiting from their orchestrator roles. Some platforms, such as the UK-based betfair.com have dramatically changed the structures of their respective businesses, and driven incumbents out of business as participants join in the platform instead of making business in the traditional way [10]. Other examples of the market-changing platforms include Airbnb (hotel industry) and Uber (transportation industry).

Platforms not only transform the modes of consuming, but also how firms come up with novel offerings. Most new product and service innovations are not created in-house, but in a network of many firms. It is very difficult to bring something new to the market that would not include technology or services that some other firm owns. Platforms may offer modular and complementary offerings that are already better than a firm would produce in-house. This means that every firm should take platforms into account in their corporate strategy; particularly, considering: how to become a part of an existing platform as a complementor, or how to successfully establish a platform for others to build on.

In this paper, after reviewing the literature on the definition of a platform and on platform participant roles, we present four platform categories to highlight the differences in platforms and the need for different types of platform orchestration. Then we present three platform orchestration modes that any participant can pursue in order to improve the efficiency, and develop and renew business in the platform. It is concluded that a winning platform is a combination of efficiency, development and innovation. Each of the orchestration modes is different in terms of goals, value co-creation logic, interdependencies, sources of synergy, and growth patterns. Suggestions of concrete orchestration processes are also presented.

### 2. Definition of platform

In this section, we review previous studies on platforms. Based on our own literature review, we conclude that common to all successful platforms are 1) co-creation of value, 2) interdependency and complementarity of components, 3) surplus value for the whole system (i.e. synergy) and 4) evolutionary growth.

Firstly, a platform’s offering to an end user is not created by a single firm. Several firms and also the end user him/herself participate in the co-creation of value. In platforms, it can be said that the end user value is a result of value constellation [11], [12].

Secondly, platforms are repeatedly defined as a set of components that constitutes a system [12]–[16]. This system comprises components that are functionally interdependent. For example, software and hardware are two interdependent components of the PC platform. In other words, functionality of a PC is dependent on the existence of both hardware and software. In fact, components of a platform are in a complementary relation with each other which is necessary to ensure functionality of the entire system so that it is demandable [13], [14], [16].

The third attribute of a platform as a system is the surplus value created as a result of complementarity and interdependency of components. A platform facilitates the creation of synergies - the value co-created by aggregation of each component as a whole.
system is more than the sum of values created by each component separately [17].

Finally, platforms are evolving systems capable of adapting. They can be expanded by either building upon new components or connecting to other systems, or other platforms. After reaching a certain threshold of momentum in the number of participants and relationships between them, platforms develop in an evolutionary manner (i.e. random variation, selection and retention processes). An evolutionary attribute is necessary because it allows the platform to maintain its current participants and simultaneously attract new ones.

Platforms create a network of relationships among the participants. There are two trajectories on which networks are formed: goal-directedness and serendipity. In goal-directed networks, the participants see themselves as a part of network committed to some common goal. The network is formed to achieve this goal. In serendipitous networking, there is no pre-existing goal, and the network develops in an evolutionary manner [18].

The process by which Apple orchestrated its iPod product and iTunes service is an example how platform growth changes from a goal-oriented to a serendipitous process – from executing a focal firm’s strategy into an ecosystem. In the beginning, Apple developed iPod in collaboration with selected companies: a couple of technology providers and one content provider. A goal was set to bring a new music player to the market. In 2004, the network was expanded with tens of content producers, technology producers and also producers of peripheral devices. It is notable that several of Apple’s competitors joined the network, intermediated by the technology providers.

As a result of serendipitous networking, there are many focal participants who may have different goals for their network relationships. This leads to a decentralized and distributed structure as the multiple platform cores in the ecosystem are compatible but not strongly dependent on each other. The network spreads out to include a wide variety of businesses.

The Apple iPod case illustrates how a business ecosystem emerges around a networked platform. Each of the central participants orchestrates their own niche that is connected to the larger ecosystem from some of the complementary products or services.

A platform enables the formation of an evolving market between actors who would not be able to connect on their own without the platform. The complementary components brought together in this interaction provide superior value to end users, which is far greater than the sum of values of each component used separately.

According to the attributes of a platform explained above, we define a platform as: any virtual or physical venue that enables all participating groups to co-create and co-capture value by interactions which result in offering a system of products, services or both [19].

3. Platform participants

Platform participant groups include end users, platform owners, platform providers, complementors and orchestrators. In the case of social media (e.g. Facebook), the user account holders are the end users, which is also called the demand side [20]. Facebook corporation itself is the platform owner, which is a firm that owns the core element of the technological system that defines its evolution [12], [13]. In Facebook’s case, it possesses the technology and license of using the Facebook platform and sharing it with the participants. Moreover, there is a participating group called the platform provider. Internet access providers are Platform providers in the Facebook example. A platform provider is an intermediary between a user and the platform. Platform providers are the primary contact points of the platform’s end users [6], [20].

Complementors are often labeled according to the specific complement they provide to the platform thus differentiating between different segments of complementors. For example in the case of the ICT industry, “content developers” provide different contents to the platform, and “device manufacturers” provide devices used for the platform [16]. In Facebook, advertisers and app developers belong to this group of participants. To sum up: Complementors comprise the supply-side of the platform [20]. Complementors offer a complementary product or service to the core component of the platform [2], [13].

The platform literature emphasizes the role of a focal actor for the business ecosystems that is dependent on the platform: e.g. focal actor who strives to share the standards [21], develop the industry vision [21]–[23], maintain the integrity of the platform and its evolution [3], [13], “exercise the property rights and determine who may participate in a platform-mediated network and for developing its strategy” [6].

This central role has been referred to by different terms in different studies. Some studies have used ‘platform leader’ [2], [13]–[15], [22], some have used the term ‘platform sponsor’ [6], [20], [24], [25], and others have used ‘keystone organizations’ [21], [26], [27].

We refer to this central role as a platform orchestrator. The orchestrator influences how successful the one-sided, two-sided or multi-sided market is around the platform. It is important to note that the orchestrator is a secondary role, and in theory
can be taken by any of the participants. However, the platform owner has an advantage of acting as an orchestrator since the owner controls the proprietary and technological interfaces of the platform core. As the market evolves and becomes more complex around the platform, then orchestration opportunities open for other participants as well, or a platform owner can decide to voluntarily grant agency of orchestration. The platform participant roles are summarized in Table 2.

Table 2: Platform participant roles

<table>
<thead>
<tr>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>End user</td>
<td>Demand side for the final offering of the multi-sided market around the platform</td>
</tr>
<tr>
<td>Platform owner</td>
<td>Legal entity that owns the core of the platform</td>
</tr>
<tr>
<td>Platform provider</td>
<td>Intermediary who delivers the platform (e.g. internet operator). Mediating use interaction</td>
</tr>
<tr>
<td>Complementor</td>
<td>Supply side of the multi-sided market around the platform. Providing complementary product or service to the core of the platform.</td>
</tr>
<tr>
<td>Orchestrator</td>
<td>Acts in inducing value co-creation between participants. Secondary role that is most often connected to platform owner role.</td>
</tr>
</tbody>
</table>

Platform participant can play many roles simultaneously, and the roles may also change over time. This is common in, for example, Facebook where the end users become complementors and even orchestrators of their own niche of the ecosystem around the platform.

4. Platform orchestration for efficiency, development and innovation

In this section, we explain the platform orchestrating modes. There are different types of platforms in terms of investments for front-end ICT and amount of collaboration among participants. Based on these distinguishing factors, the platforms can be labeled as leading platforms, closed platforms, open platforms and internal platforms [28]. Each one of these platforms requires different types of management.

ICT affects the capability of end users, complementors and platform owner to co-create value, thus acting as a multiplier of value. Investments in front-end ICT (e.g. Amazon.com personalized home page for each participant) distinguish platforms from one another [28]. There are platforms that consider user experience (UX) of the front end their top priority and aim to distinguish themselves from their competitors based on user experience.

Another distinguishing factor is the amount of collaboration (e.g. negotiations, integration, flow of resources and money) between the participants in the platform [28]. The amount of collaboration goes hand in hand with the assumption of increased amount of participant groups and segments. When these increase, the complexity of the network of relationships around the platform increases. The less restrictions there are on behalf of a platform owner for participants to join in, the more communication and coordination among participants there will be. Figure 1 presents the four categories of platforms.

Figure 1: Four types of platforms [28]

The type of the platform sets contingencies on what the platform orchestrator should focus on and platform orchestration differs significantly in each of the categories.

Efficiency, development and innovation as the modes of orchestration can be separated from the theory of the firm literature and can be called fundamental tasks of an organization [29]. These three modes are not conflicting, but describe how a firm can sustain its competitive advantage from different angles. Efficiency is highlighted in theories of scale and scope of production [30], development from the point of view of theories of knowledge accumulation [31], [32] and innovation from the point of view of technological change and entrepreneurship as forces transforming society [33], [34].

Similar conceptualizations of three types of management with differing connotations have also appeared in writings on managing intellectual capital of a firm [35], mapping regional and organizational network structures [36], [37] and networks between firms in an industry [38]. There is also a people-level conceptualization that proposes that any organization
today should include three management styles of hierarchy, heterarchy and responsible autonomy [39] in order to simultaneously manage for efficiency, development and innovation in an organization.

Next, each of the orchestration modes is connected to a platform type and interrelations between 1) co-creation of value, 3) interdependency and complementary of components, 3) surplus value created, and 4) evolutionary growth pattern are theorized. After this, concrete orchestration processes can be designed.

Orchestration means facilitating the processes that lead to and promote activities among the participants [40]. When engaging in value co-creation in the platform, the participants form a structure which can be thought of as constituting a network, a third governance structure in addition to markets and hierarchies [c.f. 31]. Any given central actor of the network lacks hierarchical authority towards other actors, which means that the network cannot be managed with command-and-control types of management methods.

In internal platforms (e.g. company internal marketplace in a multi-national corporation), the end users and complementors are well known and specified, making collaboration predictable and ICT systems workable with minimum requirements. Front-end ICT is not a top priority when the participants are known because organizational boundaries restrict participation.

This type of platform requires orchestration focusing on efficiency. The goal is to make transactions in the platform as efficient as possible – the more transactions there are, the more efficient the platform should become. This makes possible synergies from bundling complementors’ offerings by lowering the transaction costs of end users. The interdependencies among participants are contract-based. The value co-creation logic is mechanistic, machine-like, and is based on deals between participants that take place in the platform. Concrete orchestration processes for efficiency are, for example, facilitation of transactions, managing reliability of participants and transactions and processes that make efficient use of existing knowledge possible.

In closed platforms (e.g. logistics service-provider web front-end for tracking parcels), the type of end users and complementors are also well known. The platform owner decides whether the participant can join the platform. There are only selected external participants who are related to the business of the platform owner (e.g. in the case of parcel delivery tracking system). The participants’ attention is directed towards the specific transaction making requirements for straightforward and predictable collaboration.

Front-end ICT is important in closed platforms as the differing end user needs have to be served well with the combination of the capabilities and assets of the participants. Furthermore, front-end ICT should be designed in such a manner that end users are able to actively co-create value and possibly serve themselves in a given task, in order to reduce the need for customer service managed by the platform owner.

The end user of an open platform (e.g. user of a snippet of code for software in open source code platform) may be not specified at all. Here the platform owner does not restrict participants’ options of joining the platform. Open platforms are more bound towards collaboration and substance without a platform owner investing heavily in front-end ICT. The end users assemble their own user specific combinations of platform offerings by using a front-end ICT system that requires skills and dedication to use.

Open and closed platforms are depicted here as facing similar kinds of orchestration. In both of them, each interaction among participants requires tailoring according to user needs, instead of merely executing transactions. Knowledge is more complex compared to the internal platform, since the organizational boundaries do not restrict participation. This affects the value co-creation logic making it organic with ongoing dialogue – during operation and interaction, the participants’ capabilities are improved. The management of interdependencies should be directed towards facilitating reciprocal interactions among participants. Sources of synergy come from mutual learning and co-elevation of capabilities of participants. The offering is incrementally improved thus making the offering for end users more than just a bundle of existing modules.

Open and closed platforms require orchestration of processes to facilitate long-term reciprocal interactions and processes of retention and refining of knowledge. When engaged in ongoing and reciprocal development activities the participants are being locked into the platform that leads to increased robustness.

Leading platforms (e.g. leading on-line retailer in the market) attract participants and connect a wide variety of end users and complementors thus setting high requirements for both collaboration and front-end ICT and making them highly complex. The orchestration in them should be focused on creating novel offerings with platform participants. The value co-creation logic is self-organizing, chaos-like, and the competencies are continuously created and renewed. In this case, the orchestrator should facilitate processes that result in ad-hoc interactions, emergence of new offerings and creation of new knowledge. These activities lead to increased diversity in the platform and improved reach across fields of business. Table 3
summarizes orchestration for efficiency, development and innovation.

### Table 3: Orchestration for efficiency, development and innovation

<table>
<thead>
<tr>
<th>Orchestration mode</th>
<th>Efficiency</th>
<th>Development</th>
<th>Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value co-creation logic</td>
<td>Mechanistic, supplier-buyer deals</td>
<td>Organic, ongoing dialogue</td>
<td>Chaotic, self-organizing</td>
</tr>
<tr>
<td>Interdependencies</td>
<td>Contractual, transaction-based</td>
<td>Reciprocal</td>
<td>Trust-based</td>
</tr>
<tr>
<td>Sources of synergy</td>
<td>Lowering transaction costs, Bundling offerings</td>
<td>Incremental improvements, co-elevation of capabilities</td>
<td>Novel offerings</td>
</tr>
<tr>
<td>Growth pattern</td>
<td>Repeated transactions leads to platform efficiency</td>
<td>Retention of participants leads to platform robustness</td>
<td>Innovation activities leads to more platform diversity and reach</td>
</tr>
<tr>
<td>Orchestration processes (e.g.)</td>
<td>Facilitate transactions, Manage reliability, Use of existing knowledge</td>
<td>Facilitate long-term reciprocal interactions, Retention and refining of knowledge</td>
<td>Emergence of new offerings, Facilitate ad-hoc interactions, Creation of new knowledge</td>
</tr>
<tr>
<td>Type of platform most applicable</td>
<td>Internal</td>
<td>Open and closed</td>
<td>Leading</td>
</tr>
</tbody>
</table>

5. Conclusion

Platforms will increasingly become part of everyone’s daily life from retail to hobbies and healthcare. Platforms are competing against each other for participants. The big question is how to create and orchestrate a platform that grows and survives the competition.

The capacity to renew the platform’s offering is essential for platform evolution and growth. It is difficult to lock-in participants if the platform does not continuously offer something new and of value. This distinguished, for example, Myspace from Facebook in social media industry and Napster from Spotify in the music industry. As soon as the platform offering becomes static, it can be copied by a competing platform and participants begin to have more options to choose from thus lower costs of switching.

It seems that successful platforms are ambidextrous: they have not only managed efficiency of transactions and incremental offering development, but also empowered third parties to innovate novel offerings. This notion highlights the importance of innovation orchestration in platforms.

Investments in front-end ICT and the amount of collaboration between participants were introduced as distinguishing factors of different platform types [28]. Naturally there are other ways to conceptualize differences among platforms and explain contingencies for platform orchestration. For example, criteria that deal with offering specific characteristics of the platform (e.g. simple – complex) could be used instead. Another way to distinguish platforms would be to use the number of participating groups: one-sided, two-sided and multi-sided platforms pose different contingencies for orchestration.

However, novel offerings are unlikely to emerge without superior front-end and high amount of inter-participant collaboration. Similarly, highly efficient transactions require a known set of participants and attention to back-end processes.

It can be argued that a winning platform should be simultaneously orchestrated for efficiency, development and innovation, as well as including elements of all four above-mentioned platform types: internal, open, closed and leading platform. Making a logical distinction between the modes of orchestration presented in this paper helps managers in the platform business focus their attention on efficacious actions and understand the systemic and evolutionary aspects of platforms.

The logic is that a novel offering attracts more participants that engage in transactions with each other, and over time get locked-in to the platform. Transaction facilitation, locking-in, novel offering creation and participant attracting form a self-enforcing loop that can be orchestrated (Figure 2). Transactions require orchestration for efficiency, locking-in, and attracting requires orchestration for development, and creation of novel offerings requires orchestration for innovation.
Business ecosystems are formed around platforms, and in the ecosystem, the platforms are connected to each other – some technology or service that constitutes the core of the platform for some niche of the ecosystem may be connected as a complementary in another niche of the ecosystem. Management of platforms and managing the business ecosystems are essential strategies for any company.

This paper presented preliminary thoughts on platform orchestration. There is no one ideal way of orchestrating, but some ways are better than others, depending on the contingencies posed by front-end ICT and inter-firm collaboration. A systematic data-driven approach on the network that participants form in the platform is useful. In launching a new digital platform to the market, platform orchestration for efficiency, development and innovation should be taken into account in the early stage of creation of the platform core because in digital platforms, the business model is closely related to the technical specifications.

Platforms are currently understudied in academia despite their significance in the economy. As socio-technical systems, they provide fertile ground for research from many different angles. More research is needed to validate and further develop the conceptualization of platforms presented above. In future research, the following questions should be addressed: Are investments in front-end ICT and collaboration truly distinguishing factors? Are there platforms that fit the definitions of a leading platform, closed platform, open platform and internal platform, or are these merely characteristics that every platform has? How have the leading platforms evolved in terms of focus on efficiency, development and innovation?

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7. References


