Taxonomy of Digital Platforms: A Platform Architecture Perspective

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Abstract. Digital platforms—technical core artefacts augmented by peripheral third-party derivatives—afford organizations to integrate resources in networked business ecosystems. Although digital platforms widely differ in their configurations, digital platforms' *dimensions* and *characteristics* to disentangle different digital platform configurations are under-researched. To bridge this void, we employ Nickerson et al.'s method for taxonomy development to systematically derive a taxonomy of digital platforms. Specifically, we embrace a platform architecture perspective to capture the configuration of digital platform's components. The resultant taxonomy facilitates a more pronounced understanding and grouping of digital platforms as configurations of certain *dimensions* and *characteristics*. Our findings suggest that digital platforms exhibit characteristics on at least four dimensions—namely, *infrastructure*, *core*, *ecosystem*, and *service* dimensions. Second, through instantiating the taxonomy, we find that digital platforms that exhibit *similar* characteristics share identical architectural profiles and, therefore, belong to one of three digital platform archetypes—namely, *orchestration*, *amalgamation*, and *innovation* platforms.

Keywords: Digital Platforms, Taxonomy, Platform Architecture, Platform Ecosystems, Archetypes.

1 Introduction

This study investigates *digital platforms*—sets of stable technical core artefacts augmented by peripheral third-party derivatives, and associated organizational arrangements [1]. A digital platform facilitates the integration of resources in business ecosystems and becomes increasingly valuable when more third parties join the platform and add their complementary derivatives [2]. Omnipresent in today's industries, digital platforms differ in their configurations [2, 3]—as exemplified by social media (e.g., Facebook and LinkedIn), mobile operating system (e.g., Android and iOS), payment (e.g., PayPal and Apple Pay), and peer-to-peer (e.g., Uber and Airbnb) platforms.

Beyond the diversity of digital platforms in practice, our review of digital platform literature exposes a wide variety of digital platform conceptualizations [1, 4]. We are specifically concerned that IS and management discourses on digital platforms [4] do

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not consider the specific characteristics of digitality [5]. Conversely, they treat all technological platforms as a homogeneous group in which classifications are merely based on organizational arrangements [1]. For example, for *digital* platforms, openness does not merely relate to organizational arrangements such as entrance and exit rules, but also to openness of technologies such as software development kits [1].

The abovementioned diversity in digital platforms' instances and conceptualizations calls for a digital platform taxonomy to disentangle different digital platform configurations [2]. Taxonomies play a vital role in research and practice because the classification of objects helps researchers and practitioners understand and analyze complex domains [6]. For digital platforms, a taxonomy would organize digital platforms' divers instances and conceptualizations into a coherent organizing structure. To this end, we first extract digital platforms' *dimensions* and *characteristics* from existing digital platform instances and studies. Relying on such dimensions and characteristics, we then develop a digital platform taxonomy and eventually instantiate the resultant taxonomy to derive digital platform archetypes. This research therefore seeks to answer the following research question: *Which dimensions and characteristics distinguish digital platforms through their architectural configuration?*

To answer the research question, we first follow Reuver et al.'s [1] recommendation to provide clear definitions for key concepts in the digital platform context. Subsequently, we follow Nickerson et al.'s step-by-step and well-structured method for taxonomy development [6]. In this process, we code digital platform articles to identify a sample of 34 digital platform instances. The resultant taxonomy postulates digital platforms' dimensions and characteristics. We instantiate this taxonomy with the 34 digital platform instances to derive digital platform archetypes that capture archetypical configurations of digital platform profiles with similar characteristics.

Thereunto, we promote the use of *platform architecture* as a focused perspective to effectively capture the configuration of a given digital platform's components. Platform architecture here refers to the fundamental organization of a digital platform, embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution [4, 7]. We opt for this perspective as it conceptualizes digital platforms as layered modular architectures that uniquely differ in their components' configurations. Relying on the platform architecture perspective, we supplement prior research with a taxonomy and archetypes of digital platforms both of which rest on digital platforms' architectural dimensions and characteristics.

2 Research Background

Since this study aims to develop a taxonomy of digital platforms, we first provide an overview of digital platform research. We then review the presence of taxonomies in IS (in general) and digital platform research (in particular) to motivate and position our study. Eventually, we introduce digital platform architecture as this study's specific perspective. In *briefly* sketching these streams to examine their underlying logic, our citations to these vast streams are merely illustrative; a thorough review of each would be a substantial and worthwhile project in its own right.

2.1 Digital Platforms

Originally viewed as facilitator of *bilateral* innovation activities (late 1990s) [e.g., 8], the platform concept increasingly captured networked, multi-lateral innovation activities (mid-2000s) [e.g., 9]. IS research then studied platforms as a *central* form of organizing technological innovation (2010s) [e.g., 10]. Today, the term *platform* is omnipresent in both IS and management research [1-4, 11], such as the *Information Systems Research* (ISR) special issues on *Platforms and Infrastructures in the Digital Age* [5]. Thomas et al. [4] organize platform research on a continuum from *firm-internal* to *firm-external* platforms. As digital platforms represent "layered modular technology architectures in business networks" [3, p. 186], they lie on the *firm-external* end of platform research that spotlights such business *networks* (e.g., *Android*'s mobile ecosystem). Within these networks, digital platforms mediate actor-to-actor interactions [2] and leverage innovation [12]. We thus view digital platforms as a *socio-technical* phenomenon rather than purely *technical* artefacts as they encompass both a technical core as well as business networks mediated by a technical core [1]. Table 1 synthesizes the key concepts that represent our understanding of digital platforms.

Table 1. Key Concepts in the Digital Platform Context

Concept	*Definition*
Platform Owner	Natural or legal entity that designs, implements, and maintains the digital platform [13]
Third Party	Natural or legal entity that augments the technical core with complementary derivatives (e.g., software extensions, services, and sales channels) [14]
End User	Natural or legal entity that uses the resources available on the digital platform [2]
Digital Ecosystem	Complex network of platform-mediated actor-to-actor interactions, turning increasingly accessible to end users through third parties' platform derivatives [13].
Service	Specialized competences (knowledge and skills) exchanged among different actors in the digital ecosystem through deeds, processes, and performances [15]
Technical Core	Extensible codebase serving as a building block upon which third parties devise platform-augmenting derivatives [16]
Digital Infrastructure	The computing and network resources that allow distributed actors to facilitate their resource exchange across spatial, temporal, and organizational boundaries [5]

2.2 The Role of Taxonomies in IS and Digital Platform Research

Intuitively, taxonomies[1] serve as sorting schemes to systematically organize objects in a domain of interest (e.g., digital platforms), a fundamental problem in many research disciplines [17, 18]. Technically, Nickerson et al. define a taxonomy T as a set of n dimensions, with each dimension consisting of at least two mutually exclusive and collectively exhaustive characteristics such that each object under consideration instanti-

[1] Prior literature often uses the different terms classification, framework, typology, and taxonomy equivalently [5]. As we employ Nickerson et al.'s method for *taxonomy* development [5], and as *taxonomy* is also the most common term across research disciplines, we opt for common recognition and consistency and use taxonomy *exclusively*.

ates one and only one characteristic for each dimension [6, p. 440]. The role of taxonomies—organizing IS domains through classifying objects of interest within these domains—is well recognized in the IS literature. Glass and Vessey [19] note that taxonomies provide an organizing structure to the IS body of knowledge. Fiedler et al. emphasize that taxonomies have been important in research "since Aristotelian applications over 2000 years ago" [20, pp. 11-12]. Similarly, Sabherwal and King argue that "taxonomies also help us understand divergence in previous research findings" [21, p. 180].

In the specific domain of digital platforms, prior digital platform research calls for using taxonomies for distinguishing digital platforms to ultimately specify different digital platform configurations [1, 3, 5]. However, only few theoretical accounts postulate *fragmented* dimensions and characteristics of digital platforms. For instance, while Kazan et al. [3, p. 187] conceptualize "two strategic architectural dimensions" of digital platforms—that is, (1) *core platform* and (2) *infrastructure* dimensions—, their research objective is not to classify digital platforms. Similarly, Williams et al. [22] focus on digital platforms' *digital service* dimension in deriving a taxonomy for platform-mediated digital services. Karhu et al. [23] promote *platform openness* as a dimension of platform architecture—differentiating *access openness* and *resource openness* (characteristics). However, their phenomenon of interest is platform forking in which a hostile firm (i.e., a forker) exploits a digital platform's shared resources, core and complements, to create a competing platform business. Overall, as there are fragmented discussions on classifying digital platforms, we reconcile a set of digital platform articles in the organizing structure of dimensions and characteristics to systematically derive a taxonomy of digital platforms for a specified use and purpose—that is, distinguishing digital platforms based on their architectural configuration.

2.3 Digital Platform Architecture

As the use of proper research perspectives guides IS scholars in both theory building and theory testing [24], in this study we promote the use of platform architecture as a purposeful research perspective to study configurations of digital platforms' components [7]. The targeted taxonomy's purpose is to distinguish digital platforms based on common *characteristics* within architectural *dimensions*. Our perspective effectively serves this purpose as follows. First, through viewing digital platforms as "layered modular technology architectures in business networks" [3, p. 186], this perspective accounts for the socio-technical and complex nature of digital platforms [1]. Second, its conception of digital platforms as layered modular technology architecture allows us to derive standalone but differentiating digital platform dimensions. Third, the platform architecture perspective describes a digital platform's architectural configuration to reflect the unique combination of a digital platform's components. Ultimately, this perspective facilitates the identification of digital platform archetypes as digital platforms exhibiting *similar* architectural configurations belong to the same archetype. Beyond these reasons, prior research also motivates the significance of using a platform architecture perspective for distinguishing digital platforms [1, 3, 5, 7].

3 Research Method

In this section, we outline the applied steps in our taxonomy development. We then instantiate the resultant taxonomy to derive digital platform archetypes.

Digital Platform Taxonomy. We adopt Nickerson et al.'s step-by-step and well-structured method for taxonomy development method [6] (see Table 2). This method has been frequently used in IS research [e.g., 17, 18]. As an input for Nickerson et al.'s ***empirical-to-conceptual*** (E2C) and ***conceptual-to-empirical*** (C2E) approaches, we review digital platform literature relying on [25][2] to not only derive dimensions and characteristics from extant research (C2E), but also to scrutinize digital platform instances studied in previous research to inform our taxonomy (E2C). These two approaches rest on our coding of 46 selected digital platform articles supported by *ATLAS.ti 8* as a technique in qualitative research to reduce data complexity [26].

Table 2. The Applied Steps of Nickerson et al.'s Method [6] in Our Taxonomy Development

Stage	*Stage's Application in Our Taxonomy Development*
1. Meta-characteristic: The meta-characteristic reflects the taxonomy's purpose that should rely on the taxonomy's expected use.	*Expected Use*: Digital platform designers, managers, and scholars seeking to classify digital platforms *Purpose*: Distinguish digital platforms based on their *high-level architectural configuration* (meta-characteristic)
2. Ending Conditions: Subjective and objective ending conditions determine when to terminate the method. Different ending conditions may generate different taxonomies.	*Objective Conditions*: The taxonomy consists of dimensions, each with mutually exclusive and collectively exhaustive characteristics. *Subjective Conditions*: The taxonomy must be concise, robust, comprehensive, extendible, and explanatory [6, p. 344].
3. Empirical-to-conceptual Approach: Reviewing a set of empirical instances (random, systematic, or convenience sample), the researcher tries to inductively group these instances' common characteristics into dimensions *without* considering existing conceptualizations.	*Sampling of Objects* (3.1): Coding of 46 selected papers yielding in a sample of 34 digital platform instances *Grouping of Objects* (3.2): Grouping of 34 digital platforms into 5 inductive, discriminate characteristics (*exchange*, *design* orientations; *direct*, *indirect*, *open* accesses) *Grouping of Characteristics* (3.3): Grouping of 5 characteristics into 2 inductive dimensions (*service* and *infrastructure* dimensions)
4. Conceptual-to-empirical Approach: Reviewing the previous taxonomy, the researcher tries to deductively conceptualize additional dimensions and characteristics that might not have been previously identified.	*Conceptualization* (4.1): Literature-based theorization of 2 additional deductive dimensions (*ecosystem* and *core* dimensions) *Examination of Objects* (4.2): Specification of 2 dimensions through 2 characteristics each (*private*, *federated* network; *access*, *resource* openness) after reviewing the sample of 34 digital platforms *Taxonomy Revision* (4.3): Revising final taxonomy (4 dimensions, 9 characteristics) to meet the ending conditions

[2] We search the *AIS Senior Scholars' Basket of Journals* in the *Business Source Premier* database employing the *EBSCOhost* search engine without time restriction. As digital platforms are an emergent modern concept, we also search the 2016/17 proceedings of ICIS and ECIS in the *AIS Electronic Library (AISeL)*. We select 16 journal papers, 10 ICIS papers, and 5 ECIS papers all of which have the phrase *"digital platform*"* in their abstract. The ISR special issue on digital platforms [14] is fully covered. A backward search adds another 15 papers.

First, we adopt the **E2C** approach in that we code the selected 46 papers to identify a sample of 34 digital platform instances that are studied in these 46 papers[3]. In the 1st iteration of the E2C approach, we randomly analyze 10 of the 34 instances (another 10 instances in the 2nd iteration; another 14 instances in the 3rd iteration). This resulted in extracting 5 inductive, distinct characteristics (*exchange*, *design* orientations; *direct*, *indirect*, *open* accesses). We group these 5 characteristics into 2 inductive dimensions (*service* and *infrastructure* dimensions) (see Table 2).

Second, we adopt the **C2E** approach in that we code the selected 46 papers to identify *existing* conceptions of digital platform characteristics. Therefore, we divide the 46 papers into 5 sets of 9, 9, 9, 9, and 10 papers, respectively. We thus embrace 5 iterations of the C2E approach in that we code 1 of the 5 sets of papers per iteration. We thereby identify 2 additional deductive dimensions (*ecosystem* and *core* dimensions). These 2 dimensions are specifically theorized in [3, 23]. In reviewing the sample of 34 digital platform instances, we further specify the *ecosystem* and *core* dimensions through 2 characteristics (*private*, *federated* network for the *ecosystem* dimension; *access*, *resource* openness for the *core* dimension). Rationalizing the overall 8 iterations in our taxonomy development, Table 2 synthesizes our methodological adoption of [6].

Digital Platform Archetypes. The next step is set out as the identification of digital platform archetypes. Therefore, we instantiate the taxonomy with the 34 digital platform instances to capture emergent archetypical configurations of digital platform profiles. Hence, we use architectural characteristics in each dimension as differentiating features of digital platforms to identify emerging dominant patterns that consistently reoccur. This is because digital platforms exhibiting *similar* characteristics along their dimensions should share identical architectural profiles, and belong to the same digital platform archetype [27]. We derive three dominant patterns of digital platform configuration as archetypes in this process. These archetypes are labeled as *orchestration*, *amalgamation*, and *innovation platforms* to reflect their main theoretical emphasis.

4 Taxonomy of Digital Platforms

Our findings suggest that digital platforms exhibit characteristics on at least four layered dimensions—namely, *infrastructure*, *core*, *ecosystem*, and *service* dimensions [e.g., 3, 23]. Afforded by the adopted platform architecture perspective, these dimensions reflect the socio-technical and complex architecture of digital platforms [1]. While the core dimension appreciates a set of stable technical core artefacts, the infrastructure, ecosystem, and service dimensions capture the dynamic periphery of platform components. Figure 2 sketches the identified *dimensions* that rest on the taxonomy's meta-characteristic to distinguish digital platforms from a platform architecture perspective. Figure 1 synthesizes each dimension's *characteristics* in a taxonomy of digital platforms in relation to Nickerson et al.'s *empirical-to-conceptual* (E2C) and *conceptual-to-empirical* (C2E) approaches (see Table 2).

[3] We list the 46 articles and the 34 digital platform instances in this database.

Architectural Dimension	Characteristic 1	Characteristic 2	Characteristic 3	E2C	C2E
Service	Exchange Orientation	Design Orientation	-	X	
Ecosystem	Private Network	Federated Network	-		X
Core	Access Openness	Resource Openness	-		X
Infrastructure	Direct Access	Indirect Access	Open Access	X	

Figure 1. Taxonomy of Digital Platforms

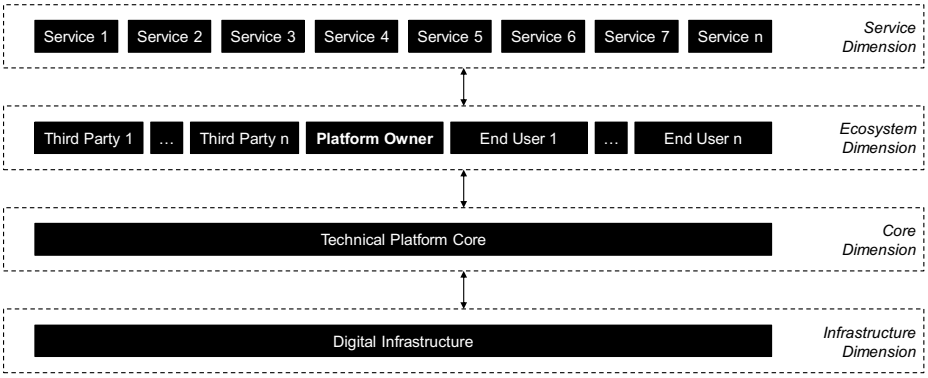

Figure 2. Digital Platforms' Dimensions from a Platform Architecture Perspective

4.1 Digital Platform's *Infrastructure Dimension*

Digital platforms are created and cultivated on top of **digital infrastructures**—here defined as *computing and network resources that allow distributed actors to facilitate their resource exchange* [5]. Examples of digital infrastructures include the Internet, data centers, open standards (e.g., IEEE 802.11 and USB), and consumer devices (e.g., smartphones and tablets). Digital infrastructures, therefore, are distinct from other types of infrastructures because of their ability to collect, store, and make digital data

Table 3. The Characteristics of Digital Platforms' *Infrastructure Dimension* [e.g., 5, 28]

Characteristic	*Definition*	*Rationale*
Direct Access [e.g., 28, 29]	Unobstructed access permission to an established digital infrastructure through the infrastructure owner that allows for guaranteed and instantaneous access	While reinforcing a platform's direct access rights through its enhanced status and market position, direct access infrastructures require costly access fees and extensive coordination between platform and infrastructure owners.
Indirect Access [e.g., 5, 28]	Obstructed access permission to an established digital infrastructure through intermediary, third-party access providers	Platforms with indirect access aim for hard-to-replicate partnerships with multiple intermediaries, allowing a plug-and-play strategy in selecting interchangeable intermediaries for cost reductions.
Open Access [e.g., 3, 29]	Unobstructed access to a new digital infrastructure devoid of permissions	Emulating direct access rights in a cost-effective fashion, open access infrastructures (e.g., blockchain) have lower market reach without comprehensive testing.

available across several systems and devices [28]. Relying on the E2C approach of our taxonomy development, we find that digital platforms access digital infrastructures in three ways—namely, *direct*, *indirect*, and *open* access. Table 3 outlines the *infrastructure dimension*'s three characteristics along with exemplary support from the literature.

4.2 Digital Platforms' *Core Dimension*

Digital platforms rely on a set of stable **technical core artefacts** of software and hardware. This set acts as technological foundation for a family of value-added platform derivatives [2]. These technical core artefacts denote an *extensible codebase serving as a building block upon which third parties devise platform-augmenting derivatives* (e.g., products, technologies, channels, and services) [16]. Relying on the C2E approach of our taxonomy development, we follow Karhu et al.'s [23] distinction of how core artefacts can interface with its periphery in two ways—namely, *access openness* and *resource openness* [23, pp. 3-6]—to promote third-party, platform-augmenting derivatives. Table 4 outlines these two characteristics of digital platforms' *core dimension*.

Table 4. The Characteristics of Digital Platforms' *Core Dimension* [e.g., 2, 16]

Characteristic	*Definition*	*Rationale*
Access Openness [e.g., 23, 30]	Granting of access to otherwise protected core artefacts to third parties by providing them with dedicated boundary resources to interact with the technical core artefact.	The rationale for *access openness* is to spark innovation within the platform ecosystem and induce third parties to use the core artefacts to create platform-augmenting derivatives that invoke positive network effects.
Resource Openness [e.g., 1, 23]	Opening the core artefacts' valuable resources by forfeiting their related intellectual property right (IPR)	The rationale for *resource openness* is that the technical core artefacts' owner sees it as advantageous to open the core resources by forfeiting related IPR.

4.3 Digital Platforms' *Ecosystem Dimension*

Digital platforms rely on a dynamic **platform ecosystem** here defined as *complex network of platform-mediated actor-to-actor interactions, turning increasingly accessible to end users through third parties' platform derivatives* [13]. Digital platforms are contingent on the availability and contribution of a critical mass of third parties within each of the relevant actor roles of the respective ecosystem. Prime examples for such actor roles are platform owner, partner, end user, and subcontractor [2, 31, 32]. Each of these actor roles offer complementary resources to the respective ecosystem to serve a wide range of end users and to satisfy various requirements [13]. For instance, Google generates most of its revenues within the Android ecosystem from advertisements powered through the use of its search engine, YouTube, and other Google services [23]. Relying on the conceptual-to-empirical approach of our taxonomy development, we follow Kazan et al.'s [3] distinction of two focal platform ecosystem characteristics—namely, *private network* and *federated network*. Table 5 outlines these two characteristics.

Table 5. The Characteristics of Digital Platforms' *Ecosystem Dimension* [e.g., 2, 13]

Characteristic	*Definition*	*Rationale*
Private Network [e.g., 1, 31]	Inward-looking, vertically integrated, and closed-loop ecosystem comprising an exclusive selection of private actors that shield their services from unauthorized actors	Private networks enact closed-loop systems to efficiently settle resource exchanges *within* their own boundaries. While the latter is virtually free, instantaneous, and guaranteed, resource exchanges *beyond* the closed-loop system demand fees, time, and risk from the private actors.
Federated Network [e.g., 1, 32]	Outward-looking, vertically disintegrated, and open-loop ecosystem mobilizing varied platform-augmenting third-party actors	Federated networks enact open-loop systems in which value creation and appropriation is distributed among federated third-party actors. These actors intentionally co-innovate with other external third-party actors to extend the capabilities and market reach of their mutual digital platform.

4.4 Digital Platforms' *Service Dimension*

With digital service being *the* value output of digital platforms [3], digital platforms eventually aim for and contribute to a gigantic shift from a product-based economy to one based on services, specifically *digital* services [22]. Digital service here refers to *an activity or benefit that at least one party can give to another, that is, predominantly provided through a platform-mediated digital transaction* [22, p. 507]. Notably, in contrast to classical bilateral owner-user relationships, platform-mediated digital service comprises a networked service *system* to integrate various organizational and technological resources to meet a given end user's needs. While the *giving* service offeror is the digital platform owner in cooperation with at least one platform partner, the *receiving* service beneficiary is the digital service user. Moreover, while a *single* transaction is sufficient to provide a digital service, often these transactions are provided *continuously* [33] and within actor-to-actor networks that configure the platform owner, at least one third party, and the end user in a unique manner [2]. Platform-mediated digital services are characterized by two distinct orientations—namely, *exchange* or *design* orientations. Table 6 outlines these two characteristics digital platforms' service dimension along with studies that support this dimension and its characteristics.

Table 6. The Characteristics of Digital Platforms' *Service Dimension* [e.g., 22, 33]

Characteristic	*Definition*	*Rationale*
Exchange Orientation [e.g., 34, 35]	Digital service aimed at reducing transaction costs in direct actor-to-actor exchanges	Exchange-oriented digital service (e.g., Facebook, PayPal, Uber, Airbnb) realize one-to-one matches between service offerors and beneficiaries and facilitate their subsequent direct exchange efficiently
Design Orientation [e.g., 1, 23]	Digital service aimed at enabling third parties to design platform derivatives and to disseminate them to a large audience	Design-oriented digital service (e.g., iOS, Android, Windows, Amazon Web Services, Linux) realize one-to-many matches between one third-party platform derivative designer and many derivative users

5 Archetypes of Digital Platforms

Our findings further suggest that digital platforms that exhibit *similar* characteristics belong to one of the three digital platform archetypes—namely, *orchestration*, *amalgamation*, and *innovation* platforms.

5.1 Orchestration Platform

Digital platforms that assemble federated networks—outward-looking, vertically disintegrated, and open-loop ecosystems—of platform-augmenting third parties through co-opetitive and inclusive platform profiles adhere to what we label as the *orchestration platform* archetype (see Figure 3). Orchestration platforms rely on high openness—both access or resource openness—to be highly integratable with existing third-party derivatives. These platforms' challenge is to derive a governance structure that *aligns* the business and technology interests among the platform owner and its many third parties. Orchestration platforms are highly dependent on established digital infrastructures (1) to connect third parties and end users; and (2) to attain elevated levels of joint market reach. However, each transaction on preexisting digital infrastructures negatively contributes to platform participants' costs as participants pay for access.

The expository case of *Android* [23] represents a prime example of orchestration platforms. The *Google*-sponsored open-source project (*access openness*) orchestrates a massive community of independent third-party developers (*federated network*) yielding in, depending on the estimate, a dominant 80%–90% share of the mobile phone market. Relying on *indirect access* to existing digital infrastructures (i.e., the Internet and mobile telecommunication infrastructures), its app store features over 3 million apps (*design orientation*) that generate more than 100 billion downloads per year [5].

Architectural Dimension	Characteristic 1	Characteristic 2	Characteristic 3	Digital Platform Archetype
Service	Exchange Orientation	***Design Orientation***	-	***ORCHESTRATION PLATFORM***: Co-opetitive and inclusive platform profiles
Ecosystem	Private Network	***Federated Network***	-	
Core	***Access Openness***	***Resource Openness***	-	
Infrastructure	***(Direct Access)***	***Indirect Access***	Open Access	

Figure 3. The *Orchestration Platform* Archetype

5.2 Amalgamation Platform

Digital platforms that assemble *private networks*—inward-looking, vertically integrated, and closed-loop ecosystems—comprising an exclusive selection of few private actors through monopolistic and assimilative platform profiles adhere to what we label as the *amalgamation platform* archetype (see Figure 4). Such platforms allow organizations to cultivate and grow private businesses without intervention from platform-augmenting third parties. In this sense, platform-mediated interactions are tightly controlled and directed inward to reinforce an insular digital platform. Amalgamation platforms are contingent on specific resources and capabilities to implement self-sustaining

platforms by shielding their architectural dimensions from third parties. Moreover, such platforms are highly efficient, independent, and flexible in channeling their digital services through preexisting digital infrastructures. However, they face the challenge to maintain agility by avoiding the enactment of strategic linkages with third parties that are likely to introduce long-term legacy systems or platform derivatives. Such platforms rely on access to digital infrastructures to process digital services, while at the same time, seek to minimize resource outflows from its private network.

The expository case of *Pingit* [3] represents a prime example of amalgamation platforms. Launched by *Barclays* in 2012, this vertically integrated mobile payment platform captures value without third parties (*private network*). *Pingit* is designed to be a person-to-person (P2P) mobile payment exchange service (*exchange orientation*). Turning into a stand-alone application, however, it in turn incentivizes businesses to adopt *Pingit*. It is a proprietary mobile payment service as its development is fully internalized (restricted *access openness*). *Pingit* benefits from its direct access to *Faster Payments*, an existing digital infrastructure for mobile payments (*direct access*), to reach out to end users at rival banking institutions in a cost-efficient manner.

Architectural Dimension	Characteristic 1	Characteristic 2	Characteristic 3	Digital Platform Archetype
Service	***Exchange Orientation***	Design Orientation	-	***AMALGAMATION PLATFORM***: Monopolistic and assimilative platform profiles
Ecosystem	***Private Network***	Federated Network	-	
Core	***(Access Openness)***	Resource Openness	-	
Infrastructure	***Direct Access***	***(Indirect Access)***	Open Access	

Figure 4. The *Amalgamation Platform* Archetype

5.3 Innovation Platform

Digital platforms that assemble unobstructed access to a *novel* digital infrastructure devoid of permissions reverberate with our *innovation platform* archetype (see Figure 5). Such platforms embrace process innovation to deliver digital service through differentiated and cost-effective arrangements that are distinctively different from (and are seeking to transform) an industry's dominant process logic. This is realized through establishing—or forging strategic linkages with—*novel* digital infrastructures (e.g., blockchain). In this regard, affiliated stakeholders can circumvent the dominance of preexisting digital infrastructures—even though novel digital infrastructures that allow for open access may fail to become a dominant standard in facilitating digital services.

Architectural Dimension	Characteristic 1	Characteristic 2	Characteristic 3	Digital Platform Archetype
Service	***Exchange Orientation***	Design Orientation	-	***INNOVATION PLATFORM***: Hybrid and open platform profiles
Ecosystem	***(Private Network)***	***Federated Network***	-	
Core	***Access Openness***	***Resource Openness***	-	
Infrastructure	Direct Access	Indirect Access	***Open Access***	

Figure 5. The *Innovation Platform* Archetype

The expository case of *Blockchain.com* [3] leverages on third parties and subsidizing its digital services (i.e., payment, bitcoin wallets, exchange rates, JSON queries for

blockchain data) for end users (*exchange orientation*). *Blockchain.info* thereby derives value from the bitcoin community by being integratable into various agnostic third-party services (*federated network*). Opening its core artefacts by forfeiting related IPR (*resource openness*), *Blockchain.info* operates on top of the *Bitcoin Blockchain*, an open digital infrastructure without access constraints (*open access*), to deliver bitcoins.

6 Discussion and Conclusions

Mediating various networked actors, digital platforms have become a pivotal means to shape digital ecosystems. We start with the premise that understanding and classifying digital platforms relies on a dedicated theoretical account on their *dimensions* and *characteristics* to postulate different configurations of digital platforms. Embracing the lens of platform architecture [7], we follow Nickerson et al.'s method for taxonomy development. The resultant taxonomy distinguishes digital platform instances through characteristics on their *infrastructure*, *core*, *ecosystem*, and *service* dimensions. We further disentangle *orchestration*, *amalgamation*, and *innovation* platform archetypes as a function of digital platforms' integral characteristics. We next discuss this study's theoretical and practical implications, limitations, and avenues for future research.

6.1 Implications for Theory and Practice

Theoretical Implications. *First*, we contribute to mitigating the outlined challenges of diversity in digital platforms' instances and conceptualizations. The 4 *dimensions*, 7 *characteristics*, and 3 *archetypes* serve as prospective theoretical means to more effectively guide and organize future theorization on digital platforms. That is, these means (1) seek to partially unify the variety of digital platform conceptions; and (2) classify digital platform instances. Thereby, through holding clearer definitions of *digital* platforms' dimensions and characteristics, the taxonomy considers the specific characteristics of digitality as an integral aspect of digital platform research in contrast to platform research in general [4]. We, thereby, hope to increase the comparability between digital platform instances and studies [5].

Second, we also contribute to mitigating the challenges of *vertically* and *horizontally* scoping digital platforms [1, p. 129]. *Vertical scoping* issues relate to choosing the appropriate level of the architecture for studying platforms. For instance, while mobile operating systems (e.g., Android) and associated app stores (e.g., Google Play) are often studied as the focal platform, new digital platforms are currently emerging *on top* of the mobile operating system (e.g., Facebook's Android app). To this end, our taxonomy contributes to disentangling the vertical scope of digital platform research through promoting four vertical architectural layers (see Figure 2). *Horizontal scoping* issues, in turn, refer to the variety of application domains (e.g., payment, health, banking, or mobile). Little research reflects the studied digital platform's application domain. The resultant lack of *contextualized* digital platform theory inhibits our understanding of how domain-specific digital platforms affect contextual outcomes. Characterizing digital platforms' context, the taxonomy facilitates more contextualized platform theory.

Practical Implications. This study contributes to the analysis of digital platforms [36] and is not prescriptive in nature. However, it has important implications for practice. *First*, without a well-developed taxonomy, it is difficult for managers and policymakers to differentiate diverse instances of digital platforms in their industries. Our taxonomy alerts these practitioners that not all digital platforms are equal, and it enables them to differentiate them regarding their characteristics, purposes, as well as required design decisions and institutional arrangements.

Second, this taxonomy becomes especially valuable when its characteristics and their distribution across digital platform instances are quantified. Specifically, practitioners can precisely measure various platform characteristics (e.g., types, frequencies, and durations of digital platforms' accesses to their underlying digital infrastructures) to link these measurements of diverse characteristics to digital platforms' differential impacts on platform outcomes (e.g., survival, performance).

Third, the paper identifies and differentiates three digital platform archetypes. These archetypes and their illustrative examples inform practitioners in making design decisions, as the archetypes represent ideal-typical configurations that have proven effective for platform survival and performance.

Fourth, the employed platform architecture perspective highlights the importance of developing the *architectural* approach to designing and maintaining digital platforms. Through embracing an architectural view on digital platforms, practitioners account for the socio-technical and complex nature of digital platforms [1]. Moreover, as the platform architecture perspective describes a digital platform's architectural configuration, practitioners are equipped to reflect the unique combination of their digital platform's components, respectively.

Fifth, policymakers can rely on the taxonomy in ensuring fair and efficient market regulations for digital platforms' constituent actors, which is in the interests of all platform participants, particularly in the light of lock-in and winner-takes-all effects. As such, the outlined dimensions and characteristics in the taxonomy inform policymakers in drafting legislative frameworks. Such taxonomy-informed frameworks would foster and regulate innovation effectively as the taxonomy allow policymakers to account for and balance multiple relevant dimensions of digital platforms. In turn, platform managers are provided with an organizing logic to more clearly define the specific aspects required in realizing *thriving* digital platforms. This may be especially useful for early design decisions that affect digital platforms' evolution trajectories. Managers might anticipate pivotal areas of concern and take appropriate measures.

6.2 Limitations and Future Research

While the taxonomy descriptively investigates digital platforms' dimensions, characteristics, and archetypes, it does not prescribe how to effectively configure digital platforms. Prospective research may thus investigate how different configurations translate into which outcomes (e.g., performance, survival, growth, flexibility, innovation). Further, we provide no statistical insights on what digital platform characteristics occur in which frequency. Future research may thus instantiate a *larger* sample of digital platforms to empirically learn more about the statistical distribution of characteristics.

Moreover, our taxonomy results from a restricted sample of 46 studies and 34 digital platform instances. Replicating our study with more digital platform instances in further contexts to validate and refine our taxonomy is thus pivotal. Moreover, our results are limited to the focused perspective of platform architecture. Alternative perspectives are likely to result in a different taxonomy and, therefore, in alternative archetypes. Therefore, due to opting for a specific perspective (i.e., platform architecture view), we neither claim exhaustiveness of the three derived archetypes, nor the comprehensiveness of the taxonomy in capturing all possible dimensions and characteristics.

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