

**Toward Business Models for a Meta-Platform
Exploring Value Creation in the Case of Data Marketplaces**

Abbas, Antragama Ewa; Zuiderwijk, Anneke; Ofe, Hosea; De Reuver, Mark

DOI

[10.24251/HICSS.2023.455](https://doi.org/10.24251/HICSS.2023.455)

Publication date

2023

Document Version

Final published version

Published in

Proceedings of the 56th Annual Hawaii International Conference on System Sciences, HICSS 2023

Citation (APA)

Abbas, A. E., Zuiderwijk, A., Ofe, H., & De Reuver, M. (2023). Toward Business Models for a Meta-Platform: Exploring Value Creation in the Case of Data Marketplaces. In T. X. Bui (Ed.), *Proceedings of the 56th Annual Hawaii International Conference on System Sciences, HICSS 2023* (pp. 3715-3724). (Proceedings of the Annual Hawaii International Conference on System Sciences; Vol. 2023-January). IEEE.
<https://doi.org/10.24251/HICSS.2023.455>

Important note

To cite this publication, please use the final published version (if applicable).
Please check the document version above.

Copyright

Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

Takedown policy

Please contact us and provide details if you believe this document breaches copyrights.
We will remove access to the work immediately and investigate your claim.

Toward Business Models for a Meta-Platform: Exploring Value Creation in the Case of Data Marketplaces

Antragama Ewa Abbas
Delft University of Technology
a.e.abbas@tudelft.nl

Anneke Zuiderwijk
Delft University of Technology
a.m.g.zuiderwijk-vaneijk@tudelft.nl

Hosea Ofe
Delft University of Technology
h.a.ofe@tudelft.nl

Mark De Reuver
Delft University of Technology
g.a.dereuver@tudelft.nl

Abstract

*Investigating meta-platforms has been a continuing concern within information system literature due to the increasingly complex constellations of platforms in ecologies of ecosystems. A meta-platform is a platform built on top of two or more platforms, hence connecting their respective ecosystems. One promising case to benefit from meta-platforms is data marketplaces: a particular type of platform that facilitates responsible (personal and non-personal) data sharing among companies. Given that business models for meta-platforms are largely unexplored in this emerging case, how they can create value for data marketplaces remain speculative. As a starting point toward business model investigations, this paper explores value creation of a meta-platform in the case of data marketplaces. We interviewed fourteen data-sharing consultants and six meta-platform experts. We identify three potential value creation archetypes of a meta-platform. **The discovery aggregator** archetype emphasizes searching and dispatching value, while **the brokerage** one focuses on promoting and supporting value. Finally, the **one-stop-shop** archetype creates value by standardizing, regulating, sharing, and experimenting. This study is among the first that explore value creation archetypes for a meta-platform, thus identifying core value as a base for further business model investigations.*

Keywords: business models, value creation, meta-platforms, data marketplaces, data sharing.

1. Introduction

The newest wave of digital platform innovations has led to increasingly interconnected platforms, often referred to as the *ecology of platforms* (Hilbolling et al., 2020). Mosterd et al. (2021) refer to this phenomenon as Platform-To-Platform Openness

(PTPO), meaning “the extent to which a platform is interoperable with other platforms” (p. 1). Therefore, PTPO is increasingly relevant in a fragmented market to strengthen the network effect required for digital platforms to thrive. One type of PTPO is a meta-platform: an overarching platform that connects two (or more) platforms, thereby interconnecting their respective platform ecosystems (Mosterd et al., 2021). In all, a meta-platform, in turn, also has an ecosystem composed of multiple sub-ecosystems (e.g., Wang, 2021). Due to the modular nature of a meta-platform’s technological design, coordination costs are reduced, and innovation will be simpler to organize (Mosterd et al., 2021). An example of a meta-platform is Trivago, which federates digital platforms (e.g., Expedia, Booking, or Airbnb) in the tourism sector. Such platforms benefit from Trivago as a first discovery channel, hence exposing their platforms to larger user bases (Perelygina et al., 2022).

More recently, meta-platforms have become of research interest to the Information System (IS) community. Specifically, a few studies start to (implicitly) discuss business model topics concerning meta-platforms. For example, Floetgen, Mitterer, et al. (2021) explore how a meta-platform can create value by integrating services and resources among two mobility platforms. As another example, Veile et al. (2022) describe cases in which meta-platforms create value by providing standardized infrastructure.

At the same time, recent developments in the Data Economy have resulted in a proliferation of data marketplace literature (Abbas et al., 2021). Data marketplace “are platforms that provide the necessary infrastructure and services to facilitate the exchange of data products between data providers and data consumers from different environments” (Driessen et al., 2022, p. 1). Given the fragmented nature of data marketplaces, data providers and consumers suffer from difficult data discovery processes and expensive

vendor lock-in (European Commission, 2020). In all, fragmentation hinders data marketplaces from reaching sufficient network effects.

The existing fragmented nature of data marketplaces opens an opportunity to study meta-platforms in the data marketplace context. Meta-platforms may allow data marketplaces to enhance their value creation. In fact, many meta-platform projects have started recently, such as TRUSTS¹ and i-3 Market². Although meta-platforms have existed for years (e.g., Trivago), they are now emerging in the new context of data marketplaces. Data marketplaces are fundamentally different from typical digital platforms (e.g., due to the nature of data as an experience good, its non-rival characteristic, and weak appropriate regime) (Koutroumpis et al., 2020). These differences may challenge our understanding of what we know about meta-platform business models. We take a business model lens to develop a holistic understanding of the inner workings of this new phenomenon.

Nevertheless, to the best of our knowledge, no previous study has investigated the business model aspects of this specific type of meta-platforms. Consequently, how a meta-platform can create value for data marketplaces remains speculative. Hence, this study explores business models for a meta-platform for the specific case of data marketplaces. This paper focuses on value creation because this component is often the first issue to tackle in business model endeavors. Thus, we ask the following question: *How can a meta-platform potentially create value in the case of data marketplaces?*

2. Theoretical background

This section provides background information concerning: a) business models for digital platforms, b) data marketplaces, and c) meta-platforms.

2.1. Digital platform business models

Although business models can be observed via various lenses, we follow recent reviews (e.g., Böttcher et al., 2022) that categorize business models for digital platforms from the well-established components by Teece (2010): value creation, delivery, and capture. These three components are interrelated and often employed to draw business model logic (of digital platforms). Teece (2010) describes value creation as the process of making products or services that bring benefits to intended customers. Value delivery refers to relevant activities and resources to

distribute the products (or services) to consumers; value capture describes necessary monetary activities, such as defining revenue stream and cost structures, to sustain a business in the long run.

In this exploratory research, we focus on the first component of business models: value creation. As we want to categorize the identified value creation according to its core focus, we group them into value creation archetypes. Identifying value creation is often the first step toward business model development because it explores the desirability aspects of a platform: will it create value for customers, and to what extent do they want this platform? (Osterwalder et al., 2015). Without clear value creation, meta-platforms for data marketplaces may not be commercially viable in the near future. Moreover, focusing on one aspect allows us to explore the exact value creation (mechanisms).

2.2. Data marketplaces

The core value of data marketplaces is to facilitate responsible business data sharing (Driessen et al., 2022). One use case example is sharing commercial space data (earth observation) from satellites for building 3D simulations to model physical phenomena (Space Data Marketplaces, 2022). Fruhwirth et al. (2020) reveal that data marketplace value creation emphasizes privacy protection, data quality guarantee, time relevancy, and pre-purchase testability. In line with this finding, van de Ven et al. (2021) also stress the importance of secure data sharing, high (and unique) data assets, and easy data tooling. Concerning security and privacy concerns, for example, data marketplaces frequently employ emerging technologies (such as multi-party computation) to improve trust and reduce risk in data sharing (Agahari et al., 2022)

Spiekermann (2019) suggests that data marketplaces should go beyond sharing “raw” data. Instead, they need to provide analytical functionality. This assertion is supported by a finding from Bergman et al. (2022) that stresses the data paradigm as solutions rather than mere “items.” One concrete way is to create value by providing aggregated or standardized services. Koutroumpis et al. (2020) emphasize the essential value creation of data marketplaces: 1) enabling data provenance to track the origin and use of data assets, and 2) exercising data quality functionalities. This value creation is needed given the nature of data as experience and non-rivalrous goods (abstract, intangible, and easily duplicated).

¹ <https://www.trusts-data.eu/> accessed on June 09, 2022

² <https://www.i3-market.eu/> accessed on June 09, 2022

In summary, the variety in data marketplace offerings and their fragmentation open an opportunity to explore the value creation of a meta-platform for this specific case. For instance, a meta-platform can recommend users to go to data marketplaces with specific value creation or monetization schemes. It also helps to identify and mitigate business model incompatibilities. For instance, if one data marketplace offers a dataset for free and the other charges a price, they cannot be easily federated.

2.3. Meta-platforms

A meta-platform is a platform that coordinates, integrates, and connects various existing platforms (Zhang & Williamson, 2021). Referring to our example in Section 1, Trivago is one example of a *meta-platform*, where Expedia, Booking, or Airbnb have a role as *platform participants*. Hence, meta-platforms generally have a core characteristic of the need for participating platforms and thus cannot exist in a stand-alone nature (Lagutin et al., 2019). They must coordinate with multiple platform elements, such as platform core services or technical infrastructure (Soursos et al., 2016). In addition, meta-platforms need to consider other relevant stakeholders (such as end-users and third-party complementor of platform participants) to exercise value creation.

By understanding the above characteristic, we can now discuss value creation of a meta-platform. In a recent quantitative empirical paper, Ulrich and Alt (2021) discuss how a meta-platform may help integrate social networking platforms to close gender gaps in the IS community. They highlight the coordination effort to provide seamless integration services for any participating platforms, ranging from Software Development Kits (SDKs) to integrated Application Programming Interfaces (APIs) consumed by the platform participants.

A core focus of a meta-platform is to standardize platform components (Mosterd et al., 2021). In their explanation for IoT data sharing, a meta-platform may help create a smart home environment consisting of sensors and devices that are vendor-independent. They also give an interesting idea of having a filter function to help a specific mobility platform interoperable to a specific partner (e.g., road safety authorities).

Meta-platforms also offer potential value creation to increase network effects. For example, a meta-platform provides a subscription management service (Floetgen, Mitterer, et al., 2021). In this example, end-users of a bank only need to join (and interact with) a meta-platform to manage online streaming services from many platform participants. A meta-platform can also focus on aggregating information. Floetgen,

Strauss, et al. (2021) give another example in the mobility industry where two platform providers join their forces to create a meta-platform. The meta-platform creates inter-modal routing algorithms to find the most optimum travel route for travelers by considering social distancing parameters as an input (given the COVID-19 situation).

Another mentioned value creation of a meta-platform refers to the “center of gravity,” which can redirect the strategic direction of its platform participants (Zhang & Williamson, 2021). This happens when a meta-platform acts as a keystone player (e.g., Alipay or WeChat pay). Hence, a meta-platform has a high degree of influence and is even responsible for supporting platform participants’ growth and legitimacy. To summarize, meta-platforms can lead to industry convergence by facilitating innovation services and networked business models (Langley et al., 2021).

Taken together, our review of existing literature on meta-platforms reveals three important points. First, we do not find an explicit definition of meta-platforms. Hence, clear boundary conditions of meta-platforms are lacking. Second, we also do not find a discussion of success or failure stories of meta-platforms, meaning studies that theorize business model configurations and performance are lacking. Third, to the best of our knowledge, we do not identify a single study that discusses the business models of meta-platforms in the data marketplace context.

3. Research approach

We conducted an exploratory study because very little is currently known about business models of meta-platforms for data marketplaces. An inductive qualitative approach is a common approach to studying a new phenomenon (Sekaran & Bougie, 2016). We need flexibility when conducting this research because meta-platforms are not yet a well-defined and widely accepted concept. Hence, we employed a semi-structured interview approach as a primary data collection method to enable flexible follow-up and probing questions (Edwards & Holland, 2013).

We selected a non-probability sampling strategy, so-called judgment sampling, to select interview participants we considered experts (Sekaran & Bougie, 2016). We adopted this strategy since we investigated a novel phenomenon that only a few people are familiar with (Etikan et al., 2016). We aimed to engage with a representative of two primary groups: 1) meta-platform experts and 2) business data sharing consultants. The following criteria were used to identify participants: 1) familiarity with meta-

platforms and data marketplaces (i.e., knowledge of, experience with, or consideration of), 2) experience in decision-making processes, especially business models, and 3) proficiency in English.

Firstly, on October 22, 2020, we conducted an online workshop as a preparation activity before conducting our semi-structured interviews. We conducted this workshop to get an initial and quick insight into potential value creation of a meta-platform in the data marketplace context. The participants were experts working on an EU project to create a meta-platform for data marketplaces. The participants were fifteen individuals from different commercial and non-commercial organizations. We began by discussing the pain points of data marketplace operators. We later discussed potential value creation of meta-platforms that might mitigate the pain points. For example, we discussed the costly development and upgrading of the technology infrastructure of data marketplaces. Hence, one potential value is to provide shared services for non-differentiating capabilities (e.g., billing mechanisms). In total, we identified five potential value creation of meta-platforms in the data marketplace case (see Subsection 4.1).

Secondly, we interviewed twenty participants [I-01 to I-20], consisting of fourteen (internal or external) business data sharing consultants and six meta-platform experts. These consultants promote and engage with business data sharing on behalf of their respective organizations; the meta-platform experts are currently involved in interoperable data marketplace innovation projects. The complete participant overview can be seen in the online supplementary material (Appendix 1)³. Between July and November 2021, we conducted online interviews using Microsoft Teams. The interviews lasted 40 minutes on average.

Our main question asked how a meta-platform can create value in the data marketplace context, particularly how it could benefit the three primary stakeholders of a meta-platform (data marketplace operators, providers, and consumers). Before jumping into this question, we asked several introductory questions, such as interviewees' familiarity with data marketplaces, to set the stage. We showed one typical option of a meta-platform conceptualization (i.e., a so-called one-stop-shop, refer to Subsection 4.3) with a potential scenario (i.e., data providers joining a meta-platform directly) to ensure the same conceptual understanding. We allowed participants to challenge this conceptualization and scenario, resulting in two other significant findings in the later stage. The

detailed scenarios and interview protocols can be seen in Appendix 2 and 3, respectively.

We inductively analyzed our interview transcripts by adopting a two-phase coding: we intuitively annotated potential value creation into a first-order category, then grouped them further into a second-order category. Afterward, we engaged with existing literature to find inspiration for identifying value creation archetypes (see Subsection 4.3). Finally, we assigned the previously identified second-order category to the most appropriate value creation archetype.

We describe the code procedures in a *data structure* presented in Figure 1. For example, we read the following excerpt from a participant:

“But when I have several [data market] options in front of me and have to evaluate, okay, the existence, the inclusion of a data marketplace in a metadata market engine, it could be a plus to evaluate, if I have to make three-four choices, I would make the choice that has the biggest outlook in the market.” [I-01]

We annotated this excerpt into the *finding the data marketplace with the biggest outlook* first-order category, which further grouped into the *searching* second-order category. Finally, we assigned this first-order category to the *discovery aggregator* value creation archetype. To increase the internal validity of our analysis, we performed an intercoder reliability assessment to check the consistency of how the code procedures are applied by the coder (the first author), which was then reviewed thoroughly by the second author. Overall, the authors align and agree with the presented data structures. For a detailed description of the relation between the interview transcripts and the codes, please see Appendix 4 in the supplementary material.

4. Results

We discover three value creation archetypes of a meta-platform for data marketplaces: **discovery aggregator**, **brokerage**, and **one-stop-shop**. We discuss the value creation of each archetype in the following subsections, including the logic of how we derived these archetypes.

4.1. Initial exploration of meta-platform value creation

This subsection summarizes the preliminary value creation of a meta-platform based on our workshop outputs. One potential value creation of a meta-

³ The supplementary material can be accessed here: <https://doi.org/10.4121/21103867>

platform is *forwarding traffic*. Data consumers can simply search datasets via a meta-search engine. If they are interested in specific data assets, they will be redirected to a data marketplace. In doing so, a meta-platform can help improve the traffic in existing data marketplaces (that are, unfortunately, lacking at the moment).

A meta-platform can also create value by *providing shared services* for non-differentiating capabilities (e.g., billing mechanisms). Hence, data marketplace participants can focus on their core value proposition instead of spending too much effort in managing these non-differencing capabilities. Another discussed pain point of data marketplace operators is the costly development and upgrading of data marketplace technology infrastructure, mainly to keep up with recent regulations such as the General Data Protection Regulation and the Data Governance Act. Still aligning with the principle of shared services, a meta-platform, therefore, can gradually *harmonize technology infrastructure through coordination and common standards*.

The workshop also explored the potential of *membership alignment* across data marketplace participants. This effort creates value for data providers and consumers by eliminating the need to register in multiple marketplaces. Finally, a meta-platform can also provide a *central register* of data marketplace users, hence avoiding problematic users who previously committed unethical data sharing activities.

4.2. Value creation themes

This subsection further explores value creation themes for a meta-platform for data marketplaces (based on the interview findings). In relation to Section 3, the “theme” here refers to the value creation codes in the second-order category. In summary, eight broad themes emerge from the analysis.

The first identified value creation theme for a meta-platform is searchability. A meta-platform can aid in *finding data marketplaces with the biggest outlook*. In addition, a meta-platform can facilitate the *search of data assets* by enabling homogenized search across multiple marketplaces. One participant, for instance, said:

“Yeah, searching data between these [data marketplace participants] should be homogenized.” [I-19]

Another value creation theme is dispatching, meaning that data providers can upload and *transfer their meta-data descriptions*, which later be feasible for many data marketplaces. Data providers can also *receive offers* from consumers in many data

marketplaces. In all, this provides *forwarding traffic* activities from the perspective of data marketplace operators. A participant illustrated:

“If I understand it correctly, it should be the meta-data. The metadata that’s interoperable. We only show the metadata that other data markets provide, but we do not necessarily have the data sets or data assets.”

“So that [a data marketplace] users can also see the offers of other data markets.” [I-17]

A meta-platform can create value by performing promoting tasks for data providers, such as *acting as an advertising agency*. One participant commented:

“So if you look, for example, from a meta-platform point of view, I would rather see them [meta-platforms] as an advertising agency where you can help to find datasets.” [I-03]

Moreover, a meta-platform should be able to analyze transaction data to *inform appropriate data demands* for data providers; as one interviewee put it:

“As a provider, you know or have an idea, at least, where your data is residing or know if there are any demands of your data on the different platforms...that you have insights in the usage or potential use. I get so statistic, let’s say.” [I-10]

The comment below illustrates how a meta-platform can also create promotion value by *showcasing a successful use case*, hence providing proof of data sharing value.

“It is a showcase on [a data provider] can do and when someone wants to do something with [a data provider]. They will go directly to [a data provider], or through the marketplace.” [I-08]

A meta-platform can provide support to data providers and consumers. For example, a meta-platform may provide *data pricing assistance* to help them get the most optimum price. Another potential support relates to *onboarding processes*.

“Then, customers [data providers or consumers] need to enroll with us over the register and enroll to our rules and get a contract with us, etc. So probably that is a bit too much of a hassle, so I think that such a meta-marketplace could be in the boost for [customers] to further sell this kind of metadata to the market.” [I-02]

The next identified value theme is standardizing. A meta-platform, often together with data marketplace participants, create *standardized Application Programming Interfaces (APIs)*.

“Yep. So there is more than one is the standardization of the marketplace, so you got one marketplace to find everything, and the second one is the standardization of the let’s call it API’s to eventually get that data” (I-08)

One participant also raised a concern about multiple certifications and membership schemas; so a meta-platform can create value by bridging this gap:

“Now the interesting thing is, of course, when you are going to set up a relationship with the data marketplace, you have, let’s say, specific requirements for data marketplace. So, for example, if some customers are connected to marketplace A, data marketplace B, but you want to expose it to as many as possible, but you have to comply with the difference. Let’s say technical requirements or certification requirements per different marketplaces” [I-12]

Aligned with our initial exploration in the workshop, one participant also highlighted the potential of *shared services*, particularly billing schemas to be included in meta-platform offerings:

“Maybe there can be also some interoperability in terms of the pricing. Maybe there can be interoperability in terms of whether you can purchase access to the data set of one platform and you can purchase it through another platform.” [I-18]

We also categorize the *data marketplace membership alignment* (from the workshop output) to this theme due to its attempt to standardize a joint schema for membership endeavors.

Another identified value creation theme is regulating, including *self-regulating* endeavors between a meta-platform and its data marketplace participants.

“Sometimes we see that as a public opinion coming, and we can better organize ourselves for fraud prevention and cyber security. We really are looking into it ourselves because the criminal activities are quicker than the legislator can exactly tell what we should do about it. So we try to find out what to do.” [I-12]

By having this self-regulation, a meta-platform can lead the compatibility with updated leading technologies.

“Right, so as a hub, it has to be, you know, very agile and compatible with several top technologies in the markets.” [I-05]

Additional value creation in the regulating theme can be drawn from the workshop output: *a central register of data marketplace users*. This can be beneficial to know the transaction history of data providers and consumers, hence avoiding those who previously committed unethical data sharing activities.

A meta-platform can also facilitate sharing features between data marketplace, for example, computational resources. A participant illustrated this idea:

“Computing resources probably can be exchanged, things like that. There is someone who has a lot of computational resources like GPU stuff that they just put it online and then on [a data market] you use. You

rent this infrastructure; then you rent those datasets.” [I-17]

Finally, we discover another theme: developing *programming ecosystems* (or Sandbox environments) to experimenting with data assets.

“Programming ecosystem, maybe a development ecosystem where these kinds of experiments are also possible. And then also we are in the future machine learning models can be exchanged.” [I-17]

4.3. Value creation archetypes of a meta-platform

This subsection describes the archetypal ways in which meta-platforms create value. Adopting Piccoli & Pigni’s (2013) elaboration, we refer to value creation archetypes as a generalized, high-level blueprint to portray the value creation focus of a meta-platform. An archetype consists of multiple interrelated value creation themes. We develop archetypes because our participants tend to interpret a meta-platform differently. One interviewee indicated:

“I think that there are different levels of what [a meta-platform] means. At the moment, we are completely at the beginning of the journey.” [I-18]

Figure 1 summarizes and connects a meta-platform’s value creation for data marketplaces according to its relevant archetype: discovery aggregator, brokerage, or one-stop-shop.

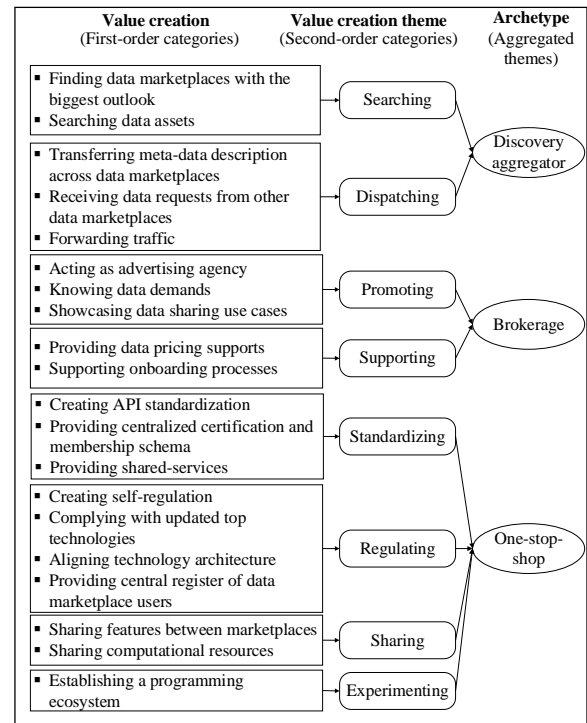


Figure 1. Value creation archetypes of a meta-platform for data marketplaces.

The first possible value creation archetype for a meta-platform is the **discovery aggregator**. According to literature, the aggregator often collects, analyzes, and offers insight from multiple data sources (e.g., Bergman et al., 2022; Garbuio & Lin, 2019). The discovery aggregator type is not focused on the role of controlling but rather on creating new connections between ecologies of platforms. Hence, rather than enforcing some regulations centrally, this archetype allows platform participants to decide their path and niche (Mikołajewska-Zajac et al., 2021).

Applied to our study's context, the discovery aggregator archetype can emphasize searching and dispatching value. Consequently, this archetype can focus on providing meta-data interoperability with (and among) data marketplace participants. After redirecting data providers and consumers to relevant data marketplaces, the meta-platform task is finished. In this regard, data providers (or consumers) must register with relevant data marketplaces (and perform transactions) by themselves. Taken together, this archetype supposes to be the simplest way a meta-platform can create value. The below comments illustrate:

"So the minimum feature, I think, is not far. It is quite close, within reach. And I think it has to do with, yes, with discovery, definitely." [I-16]

"I think in the very minimum case, you need to transfer the meta-data." [I-08]

The second potential value creation archetype for a meta-platform is **brokerage**. Slightly different from the discovery aggregation, the brokerage archetype focuses on managing business relationships (Garbuio & Lin, 2019). With its deep expertise, the brokerage archetype generally offers consulting services to solve specific clients' problems (Palmié et al., 2021). For example, the brokerage type can simplify transactions or provide capacity-building activities to improve skills (Komminos et al., 2021).

In our context, therefore, the brokerage archetype can focus on promoting and supporting value. This archetype provides value (e.g., pricing supports) to optimize business data sharing based on a) transaction insights (e.g., data demands) and b) meta-platform expertise (e.g., experience in successful use cases). In doing so, this archetype also needs meta-data interoperability with data marketplace participants. After finding the desirable data marketplaces and consumers, this archetype can provide onboarding support before establishing transactions.

The final value creation archetype of a meta-meta-platform is the **one-stop-shop (OSS)**. The OSS archetype in digital platforms often provides fully automatic services. It enables end-users to

independently use a standardized portal (or a website) to use cross-platform services (Floetgen, Strauss, et al., 2021). This standardized portal can be achieved by technical integration in the backend (Scholta et al., 2019). Floetgen, Strauss, et al. (2021) reveal that this value creation often results from a joint alliance between platform participants. An initiator act as a coordinator to harmonize the technical integration, and platform participants come together to share their resources. Moreover, according to Adebessin et al. (2013), after achieving technical interoperability, digital platforms, depending on the goals, may want to achieve a higher level of interoperability, e.g., organizational interoperability.

For data marketplaces, the one-stop-shop archetype is likely to build upon the value creation themes of standardizing, sharing, regulating, and experimenting. With a higher level of interoperability, it is possible to be interoperable beyond the mere meta-data, such as the actual data assets themselves, along with payment and contract interoperability. In the OSS archetype, data providers and consumers do not have to register to specific markets to conduct transactions—they can perform the actual transaction without leaving the meta-platform.

5. Discussion

We find three value creation archetypes of a meta-platform: discovery aggregator, brokerage, and one-stop-shop. Although these three archetypes are inspired by generic digital platform literature, the contextualization of meta-platforms, especially in the data marketplace context, makes the value specification for each archetype unique. For instance, Garbuio and Lin (2019) describe the aggregator value creation archetype on the digital platform healthcare. These digital platforms provide aggregated information from multiple sources (such as electronic health records and recent medical research) to assist clinicians in better decision-making. In our context, the aggregator focuses more on the discovery process across multiple data marketplaces to find the most relevant data assets for data providers and consumers. Similarly, while the brokerage archetype in the healthcare context focuses on building intimate relationships with patients (by taking care of their specific needs) (Garbuio & Lin, 2019), the brokerage archetype in our case focuses more on helping data providers and consumers to find data assets across data marketplaces which suits their need best, including helping to prepare transaction endeavors.

Another example can be seen in the one-stop-shop value creation archetype. This archetype has typical characteristics of regulating, standardizing, and

sharing value (Floetgen, Strauss, et al., 2021). Nevertheless, another value can be added to this archetype due to our unique case, for instance, the experimenting value. In all, we argue that the generic idea of the archetype can be found in the digital platform literature; it undoubtedly has a different meaning (or contextualization) in the meta-platform for data marketplaces. Two reasons behind this are complex constellations of data marketplaces and the nature of data itself.

A meta-platform needs to consider that well-performing, operationalized data marketplaces may keep their platform closed, or what Hodapp and Hanelt (2022) termed as *planned low interoperability* due to strategic motives to avoid direct competition. Data marketplace pursuing this competitive strategy is likely not always welcome with the idea of joining a meta-platform: they want to protect their market share. Another issue is that not every data marketplace is commercially viable at the moment (see a review by Spiekermann, 2019); hence marketplaces may potentially “piggyback” the network effects without sufficiently contributing to the development of meta-platforms.

A meta-platform also needs to consider (and prepare for) various impacts of increased network effects. In addition to antitrust regulation (Mosterd et al., 2021), a concentrated network effect in a single digital ecology negatively impacts privacy, security, homogeneity, and reliability (Hodapp & Hanelt, 2022). Considering homogeneity (i.e., innovation stagnancy), for instance, if a meta-platform becomes “too big” with massive network effects, new entrances of data marketplaces (even with the newest technological superiority) may not be sufficiently adopted.

Finally, Márton (2021) argues that every digital ecology has its limit, and platform designers must respect that limit. For example, standardization can be helpful to improve compliance but, at the same time, make the platform participants too dependent on the focal platform. Consequently, they may lose their capability and competitive advantage in the long run. A meta-platform needs to go beyond considering business performances; it must examine responsibility aspects for data marketplace participants.

6. Conclusion

This study explores how a meta-platform can potentially create value in the case of data marketplaces. Our findings show that a meta-platform for data marketplaces can have three distinct value creation depending on its focus: discovery aggregator, brokerage, and one-stop-shop. The discovery

aggregator archetype emphasizes searching and dispatching value, while the brokerage one focuses on promoting and supporting value. Finally, the one-stop-shop archetype creates value by standardizing, regulating, sharing, and experimenting.

We consider several research avenues concerning our research limitations. Many meta-platform initiatives are still in the development phase. Therefore, many of our participants engage with Minimum Viable Products (MVPs). In this regard, the applicability of our findings may be limited to the earliest phases of meta-platform investigation. Future research should investigate meta-platforms based on their actual implementation, as the value creation value may alter as adoption increases. For instance, the TRUSTS and i-3 Market projects are the candidates to conduct case study research for the discovery aggregator and one-stop-shop archetype, respectively.

Future research may also distinguish meta-platform value creation for specific stakeholders, such as data marketplace operators, providers, consumers, and third-party complementors. Furthermore, data may vary in terms of its sensitivity and privacy concerns. Thus future research could zoom in on the specific type of data. We suspect that different data types (e.g., personal/non-personal) and industry focus (e.g., automobile, health, insurance) may require different expectations and, thus, variation in value creation models of the meta-platforms.

Our study is interpretive and exploratory. Hence, another possible angle for future research is to connect the meta-platform to relevant theories. One promising theoretical framework is the recently proposed *information ecology theory* (Wang, 2021). This theory explores the potential value creation in digital ecological-related concepts that connect the “part-whole” relationship between the focal actor and the participants, relevant to our context). Some final constructs offered in this theory are relevant to our findings, such as *searching*, *promoting*, and *standardizing*. Engaging with this theory may reveal other potential value creation themes of meta-platforms.

Considering our focus on value creation, we also call for more exploration of value delivery and capture components. In value delivery, research on architecture and technical interface is vital to operationalized meta-platforms. In value capture, on the other hand, a discussion about cost structure and revenue sharing mechanisms is equally crucial for viability. For example, by considering the previously information ecology theory, we need to consider *appropriating* endeavors: how can revenue sharing mechanisms between a meta-platform and data marketplace participants be aligned? How can

intellectual property rights among the shared features be managed? The archetypes will likely impact how we manage value delivery and creation, but this assertion needs to be assessed further.

Future avenues may also explore the specific issues emerging in meta-platforms because of their unique interrelation with data marketplaces. For example, issues such as data sovereignty in data marketplaces are among the emerging topic in the literature (e.g., Hummel et al., 2021). The unique characteristics of meta-platforms may challenge our understanding of the antecedents (e.g., root causes) and consequences (e.g., willingness to share data) on such specific issues.

Another attractive pathway is to examine the potential hybrid role of a meta-platform. It is quite conceivable that users connect to meta-platforms indirectly (via the underlying data marketplaces) and directly (so directly uploading/consuming their data to the meta-platform). Hence, to what extent this hybrid role affects data marketplaces' willingness to join is subject to further examination.

Future research may also investigate the interrelationship between value creation archetypes, as these relationships are frequently not mutually exclusive. Despite the emphasis on regulation and standardization, the one-stop-shop will likely also provide searching and dispatching value. On the basis of this assertion, multiple evolutionary paths can be observed. For example, the discovery aggregator can be the starting point because of its simple form. Along the way, a meta-platform can evolve in either the brokerage or one-stop-shop direction, which depends on specific variables (e.g., power or influence on data marketplaces participants). The veracity of this assertion must therefore be investigated further.

We frame our contribution to the IS digital platform literature by considering two main issues: conceptual ambiguity and scoping (see De Reuver et al., 2018). As the meta-platform is a new type of platform, we use business models as a tool to do the exploration. We find three value creation archetypes: discovery aggregator, brokerage, and one-stop-shop. Prior studies do not conceptually define meta-platforms but rather jump in straight to discuss their offerings. Taken together, we scope the meta-platform context, which is an essential first step for creating a contextualized-classifying theory (see Gregor, 2006). Hence, we reveal a delineated boundary condition to theorize meta-platforms, which are underexplored in the literature.

In addition, we contribute scientifically by adding specifications to the existing value creation archetypes in the literature; and show how it is substantially different case-by-case. Finally, this study is among the

first that explore value creation archetypes for a meta-platform, thus identifying value differentiation as a base for further business model investigations.

The findings of our research will be of interest to practitioners who aim to develop a meta-platform for data marketplaces. Precisely, they can reflect on identified archetypes to analyze the focus on their value creation as a stepping stone toward commercialization.

7. Acknowledgment

The research leading to these results has received funding from the European Union's Horizon 2020 Research and Innovation Programme, under Grant Agreement no 871481 – Trusted Secure Data Sharing Space (TRUSTS), from the H2020-ICT-2018-20/H2020-ICT-2019-2 Call.

8. References

- Abbas, A. E., Agahari, W., van de Ven, M., Zuiderwijk, A., & de Reuver, M. (2021). Business Data Sharing through Data Marketplaces: A Systematic Literature Review. *Journal of Theoretical and Applied Electronic Commerce Research*, 16(7), 3321-3339.
- Adebesin, F., Kotze, P., Foster, R., & Van Greunen, D. (2013). A Review of Interoperability Standards in E-health and Imperatives for their Adoption in Africa. *South African Computer Journal*, 50(1), 55-72.
- Agahari, W., Ofe, H., & De Reuver, M. (2022). It is not (only) about privacy: How multi-party computation redefines control, trust, and risk in data sharing. *Electronic Markets*.
- Bergman, R., Abbas, A. E., Jung, S., Werker, C., & de Reuver, M. (2022). Business Model Archetypes for Data Marketplaces in the Automotive Industry. *Electronic Markets*, 32(2), 747-765.
- Böttcher, T. P., Bootz, V., Schaffer, N., Weking, J., & Hein, A. (2022). Business Model Configurations for Digital Platform Success-Towards a Typology of Digital Platform Business Models. ECIS 2022 Research-in-Progress Papers, Timișoara, Romania.
- De Reuver, M., Sørensen, C., & Basole, R. C. (2018). The digital platform: a research agenda. *Journal of Information Technology*, 33(2), 124-135.
- Driessen, S. W., Monsieur, G., & Van Den Heuvel, W. (2022). Data Market Design: A Systematic Literature Review. *IEEE Access*, 10, 33123-33153.
- Edwards, R., & Holland, J. (2013). *What is qualitative interviewing?* A&C Black.
- Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American journal of theoretical and applied statistics*, 5(1), 1-4.
- European Commission. (2020). *A European Strategy for Data*. <https://eur-lex.europa.eu/legal->

<content/EN/TXT/PDF/?uri=CELEX:52020DC0066&form=EN>

- Floetgen, R. J., Mitterer, N., Urmetzer, F., & Böhm, M. (2021). Platform Ecosystem Structures: Leveraging Platform-based Technology and the Finance Ecosystem for the New Normal. PACIS 2021 Proceedings, Online.
- Floetgen, R. J., Strauss, J., Weking, J., Hein, A., Urmetzer, F., Böhm, M., & Krcmar, H. (2021). Introducing platform ecosystem resilience: leveraging mobility platforms and their ecosystems for the new normal during COVID-19. *European Journal of Information Systems*, 1-18.
- Fruhvirth, M., Rachinger, M., & Prlja, E. (2020). Discovering Business Models of Data Marketplaces. Proceedings of the 53rd Hawaii International Conference on System Sciences, Hawaii, the United States.
- Garbuio, M., & Lin, N. (2019). Artificial intelligence as a growth engine for health care startups: Emerging business models. *California Management Review*, 61(2), 59-83.
- Gregor, S. (2006). The nature of theory in information systems. *MIS quarterly*, 611-642.
- Hilbolling, S., Berends, H., Deken, F., & Tuertscher, P. (2020). Complementors as connectors: managing open innovation around digital product platforms. *R&D Management*, 50(1), 18-30.
- Hodapp, D., & Hanelt, A. (2022). Interoperability in the era of digital innovation: An information systems research agenda. *Journal of Information Technology*, 0(0), 1-21.
- Hummel, P., Braun, M., Tretter, M., & Dabrock, P. (2021). Data sovereignty: A review. *Big Data & Society*, 8(1), 1-17.
- Komninos, N., Kakderi, C., Collado, A., Papadaki, I., & Panori, A. (2021). Digital Transformation of City Ecosystems: Platforms Shaping Engagement and Externalities across Vertical Markets. *Journal of Urban Technology*, 28(1-2), 93-114.
- Koutroumpis, P., Leiponen, A., & Thomas, L. D. W. (2020). Markets for data. *Industrial and Corporate Change*, 29(3), 645-660.
- Lagutin, D., Bellesini, F., Bragatto, T., Cavadenti, A., Croce, V., Kortensniemi, Y., Leligou, H. C., Oikonomidis, Y., Polyzos, G. C., Raveduto, G., Santori, F., Trakadas, P., & Verber, M. (2019). Secure Open Federation of IoT Platforms Through Interledger Technologies - The SOFIE Approach. 2019 European Conference on Networks and Communications (EuCNC), Valencia, Spain.
- Langley, D. J., Van Doorn, J., Ng, I. C. L., Stieglitz, S., Lazovik, A., & Boonstra, A. (2021). The Internet of Everything: Smart things and their impact on business models. *Journal of Business Research*, 122, 853-863.
- Márton, A. (2021). Steps toward a digital ecology: ecological principles for the study of digital ecosystems. *Journal of Information Technology*, 0(0), 1-16.
- Mikołajewska-Zajac, K., Márton, A., & Zundel, M. (2021). Couchsurfing with Bateson: An ecology of digital platforms. *Organization Studies*, 1-21.
- Mosterd, L., Sobota, V. C. M., Van De Kaa, G., Ding, A. Y., & De Reuver, M. (2021). Context dependent trade-offs around platform-to-platform openness: The case of the Internet of Things. *Technovation*, 108, 102331.
- Osterwalder, A., Pigneur, Y., Bernarda, G., & Smith, A. (2015). *Value proposition design: How to create products and services customers want*. John Wiley & Sons.
- Palmié, M., Boehm, J., Friedrich, J., Parida, V., Wincent, J., Kahlert, J., Gassmann, O., & Sjödin, D. (2021). Startups versus incumbents in 'green' industry transformations: A comparative study of business model archetypes in the electrical power sector. *Industrial Marketing Management*, 96, 35-49.
- Perelygina, M., Kucukusta, D., & Law, R. (2022). Digital business model configurations in the travel industry. *Tourism Management*, 88, 104408.
- Piccoli, G., & Pigni, F. (2013). Harvesting external data: The potential of digital data streams. *MIS Quarterly Executive*, 12(1).
- Scholta, H., Mertens, W., Kowalkiewicz, M., & Becker, J. (2019). From one-stop shop to no-stop shop: An e-government stage model. *Government Information Quarterly*, 36(1), 11-26.
- Sekaran, U., & Bougie, R. (2016). *Research methods for business: A skill building approach*. John Wiley & Sons.
- Soursos, S., Zarko, I. P., Zwickl, P., Gojmerac, I., Bianchi, G., & Carrozzo, G. (2016, 2016). Towards the cross-domain interoperability of IoT platforms. 2016 European Conference on Networks and Communications (EuCNC), Athens, Greece.
- Space Data Marketplaces. (2022). *Create value from spatial data*. Retrieved 25-Aug-2022 from <https://www.space-data-marketplace.eu/en/use-cases/>
- Spiekermann, M. (2019). Data Marketplaces: Trends and Monetisation of Data Goods. *Intereconomics*, 54(4), 208-216.
- Teece, D. J. (2010). Business models, business strategy and innovation. *Long Range Planning*, 43(2-3), 172-194.
- Ulrich, D., & Alt, R. (2021). Social networking platforms to close the gender gap: an analysis of female doctoral students in information systems. ECIS 2021 Research Papers, Timișoara, Romania.
- van de Ven, M., Abbas, A. E., Kwee, Z., & de Reuver, M. (2021). Creating a Taxonomy of Business Models for Data Marketplaces. 34th Bled eConference - Digital Support from Crisis to Progressive Change, Online.
- Veile, J. W., Schmidt, M.-C., & Voigt, K.-I. (2022). Toward a new era of cooperation: How industrial digital platforms transform business models in Industry 4.0. *Journal of Business Research*.
- Wang, P. (2021). Connecting the Parts with the Whole: Toward an Information Ecology Theory of Digital Innovation Ecosystems. *MIS quarterly*, 45(1), 397-422.
- Zhang, M. Y., & Williamson, P. (2021). The emergence of multiplatform ecosystems: insights from China's mobile payments system in overcoming bottlenecks to reach the mass market. *Technological Forecasting and Social Change*, 173, 121128.