

## Supplementary material for the manuscript:

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

### Appendix 1: Overview of participants of our twenty semi-structured interviews

Table 1 Overview of participants of our twenty semi-structured interviews

ID	Category	Job description	Overall Work Experience
I-01	Meta-platform expert	Director of innovation	28 years
I-02	Business data sharing consultant	Security solution manager	18 years
I-03	Business data sharing consultant	Product owner of a data platform	14 years
I-04	Business data sharing consultant	Head of Standard Business Reporting	23 years
I-05	Business data sharing consultant	Project manager	10 years
I-06	Business data sharing consultant	Commercial director	24 years
I-07	Business data sharing consultant	Chief data officer	12 years
I-08	Business data sharing consultant	Technical innovation manager	28 years
I-09	Business data sharing consultant	Data protection specialist	3 years
I-10	Business data sharing consultant	Head of architecture, innovation, and tech.	16 years
I-11	Business data sharing consultant	Senior strategy manager	32 years
I-12	Business data sharing consultant	Product owner	11 years
I-13	Business data sharing consultant	Risk manager	5 years
I-14	Business data sharing consultant	Business consultant	22 years
I-15	Business data sharing consultant	Associate director	24 years
I-16	Meta-platform expert	Technical researcher	9 years
I-17	Meta-platform expert	Deputy studio director	13 years
I-18	Meta-platform expert	Data science director	12 years
I-19	Meta-platform expert	Project manager	10 years
I-20	Meta-platform expert	Project manager	9 years

The explanation of meta-platform experts is the following: As meta-platforms do not exist (yet) for data marketplaces, the industry apparently does not have the incentives to think about creating viable meta-platforms. Therefore, we conducted a workshop and interviewed people that are forced to think about meta-platforms because the EU gives them incentives for that in funded projects.

## Appendix 2: Four possible scenarios of a meta-platform for data marketplaces

Considering the two perspectives of data providers and consumers, four possible scenarios of a meta-platform for data marketplaces can be derived (See Figure 1).

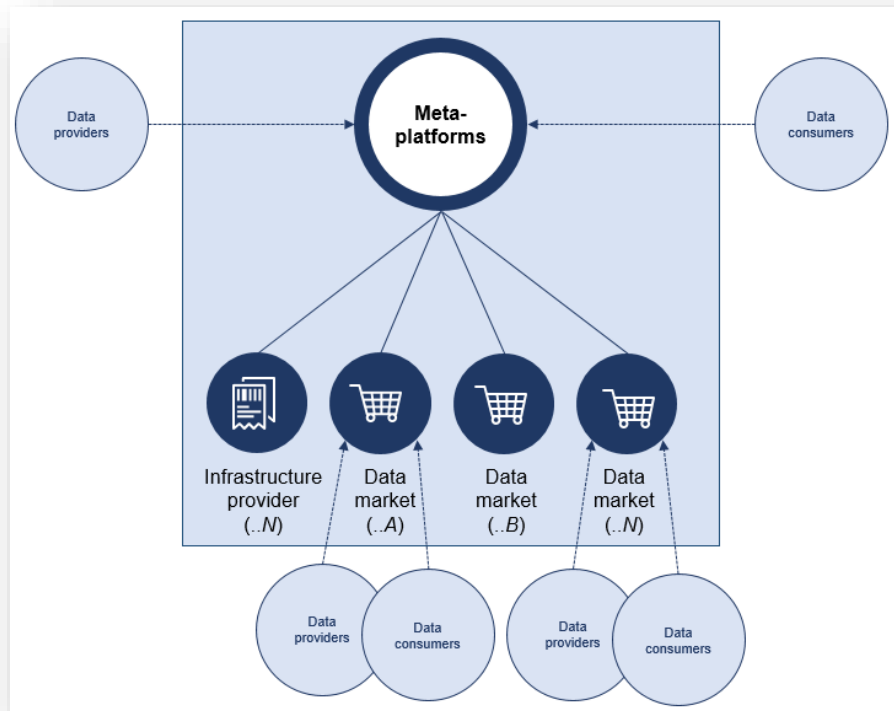


Figure 1 Four possible scenarios

These scenarios can be derived from where data providers (or consumers) are originally registered (refer to Table 2):

1. **The first scenario:** A data provider is already registered in a data marketplace. It can share business data with a data consumer registered in another data marketplace (and vice-versa).
2. **The second scenario:** A data consumer joins a meta-platform to look for data providers registered in data marketplace participants. This is comparable to the Trivago case: end users look for accommodations on multiple travel platforms (like Expedia, Booking, or Airbnb)
3. **The third scenario:** A data provider joins a meta-platform so they can be accessible to many data consumers registered in data marketplace participants. This is comparable to the Mirai meta-search case: a hotel joins this meta-platform to be visible to multiple travel platforms (like Expedia, Booking, or Airbnb)
4. **The fourth scenario:** Data providers and consumers are registered directly via a meta-platform. This is the case when a meta-platform play a hybrid role.

Table 2 Four possible scenarios

<div> Data consumers Data providers </div>	Existing data marketplaces	A meta-platform
Existing data marketplaces	I	II
A meta-platform	III	IV

## Appendix 3: The interview protocol

### 1. Opening segment

Questions about background information.

- **Question 1:** What position do you hold in this company now, and for how long have you been in this position?
- **Question 2:** Could you please tell me briefly the nature of your job?
- **Question 3:** How familiar is your organization with business-to-business data sharing? Has your organization known, experienced, or thought about it?
  - *[if yes, probe for]* Could you explain how your company conducts B2B data sharing?
  - *[if yes, probe for]* What is your role in decision-making about B2B data sharing?
- **Question 4:** Could you please tell me briefly your experience related to data marketplaces?

### 2. Middle segment

Questions about exploring potential value proposition and hindrances of business data sharing via a meta-platform for data marketplaces.

Figure 2 illustrates the presented use case to the participant:

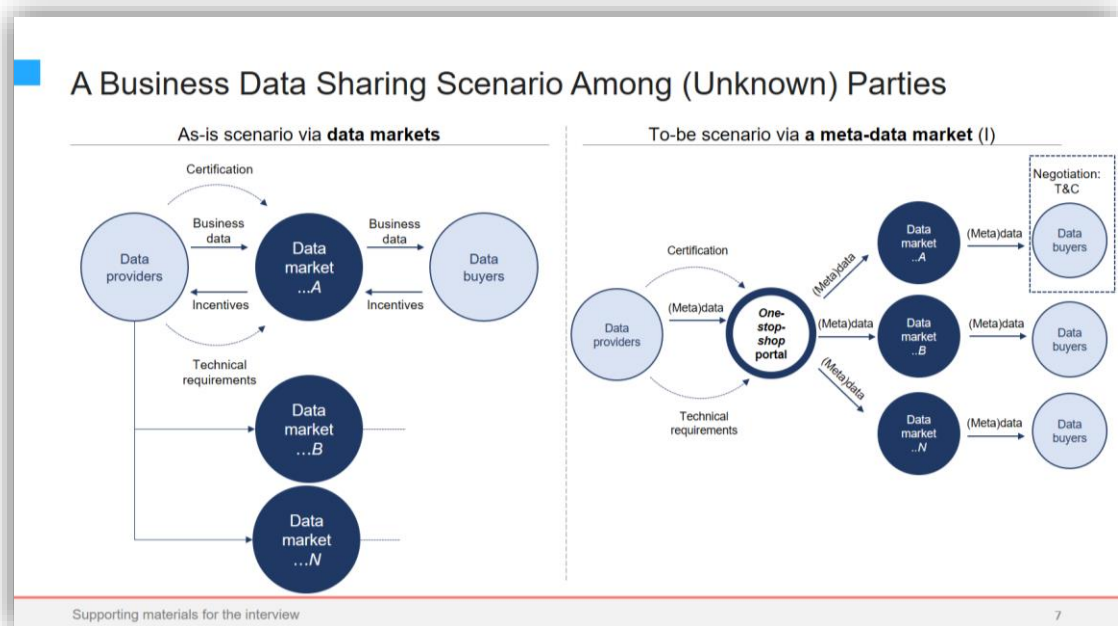


Figure 2 To-be business data sharing scenario via a meta-platform for data marketplaces

- **Question 5:** Do you have any questions related to the use case of a meta-platform for data marketplaces?
- **Question 6:** To what extent do you think a meta-platform for data marketplaces can facilitate B2B data sharing among organizations?
  - *[for greater extent, probe for]* Could you explain the reasons why it is the case?

- *[for less extent, probe for]* Could you explain why business data sharing via a meta-platform for data markets may not work?

## Appendix 4: The relation between data structure and excerpt

### Meta-platform archetype: discovery aggregator

Second-order category	First-order category	Excerpts	ID
Searching	Finding the data market with the biggest outlook	“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 meta data 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
		“Yeah, and another interesting aspect is they have an overview of the data market. So yeah, if you can just kind of overview of the market so you know in this data market want.”	I-11
	Searching data assets	“I think for the searchability to know what data is where it can help.”	I-03
		“So the minimum feature I think, is not far is quite close, within reach. And I think it has to do with, yes, with discovery, definitely.”	I-16
		“Yeah, searching data...Between this, searching the data should be homogenize.””	I-19
Dispatching	Transferring meta-data description across data markets	“I mean it's basically providing a description of the services you can deliver to certain buyers, and when the buyer say, OK, this is what I want, then they will get a direct contract with the provider to get that data.”	I-08
		“And also by offering Meta-data type of services.”	I-15
		“And interoperability between other data markets means that we provide interfaces that other data markets can use to exchange data with [an EU data market project], which means that they can upload metadata about their datasets. So that [an EU data market project] users can also see the offers of other data markets.”	I-17
		“So with this interface, should on the one hand be able to display something from other data markets, but also be usable that other data markets included in their platform to show our stuff.”	I-17
		“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 don't necessarily have the data sets or data assets.”	I-17
		“I think in the very minimum case you need to transfer the metadata.”	I-18
		“But at the minimum you need to be able to exchange metadata across these systems across these data markets.”	
Promoting	Promoting data assets	“So that [an EU data market project] users can also see the offers of other data markets.”	I-17
		“I mainly do not use the metadata market. I find it only as a value add channel to promote my product, which is the data.”	I-01
		“So you would like to OK if someone else takes care of promoting its basically then you OK that's something you may not want to do yourself that in that sense it's also	I-11

Second-order category	First-order category	Excerpts	ID
		helping to advertise that it's available and to see what the interest is there.”	
	Showcasing data sharing use cases	<p>“It's a showcase on [the name of company] can do and when someone wants to do something with [the name of the company]. They will go directly to [the name of the company], or through the marketplace”</p> <p>“I see that's clear is that they can showcase the things they have so they have also already a commercial data offering or and data that can be commercially used to put on meta-data marketplace.”</p>	I-08

*Meta-platform archetype: brokerage*

Second-order category	First-order category	Excerpts	ID
Promoting	Promoting data assets	“I mainly do not use the metadata market. I find it only as a value add channel to promote my product, which is the data.”	I-01
		“Uh, so if you look, for example, from a metadata point of view, I would rather see them as an advertising agency where you can help to find datasets.”	I-03
		“So you would like to OK if someone else takes care of promoting its basically then you OK that's something you may not want to do yourself that in that sense it's also helping to advertise that it's available and to see what the interest is there.”	I-11
		<p>“And indeed also doing the advertising to other data markets.”</p> <p>“I expect, I don't know too much about this market, but I can expect that the markets are quite specific that as a as a data owner you don't know who could be interested in this data. So you would like to OK if someone else takes care of promoting its basically then then you OK.”</p>	I-11
		“So yeah, this I think, is kind of the main idea to provide these new possibilities of adding value by distributing the different tasks related to business, like procurement of that assets in advertisements...”	I-16
	Showcasing data sharing use cases	<p>“It's a showcase on [the name of company] can do and when someone wants to do something with [the name of the company]. They will go directly to [the name of the company], or through the marketplace”</p> <p>“I see that's clear is that they can showcase the things they have so they have also already a commercial data offering or and data that can be commercially used to put on meta-data marketplace.”</p>	I-08
Supporting	Knowing data demands	“ Management of your data that you, as a provider, that you know or have an idea, at least, where your data is residing or know if there is any demands of your data on the different platforms, what the what the difference that you have insights in the usage or potential use. I get so statistic, let's say, uh.”	I-10

Second-order category	First-order category	Excerpts	ID
		“So this data market is much more interesting than this data market because in the data market B no one ever asked for your data and in data market A, hey everyone wants to have it.”	I-11
	Providing data pricing supports	“So put data, the product should be sold a lot at the highest price possible.”	I-01
		“This is this will be a more realistic price. This is really good price of equity for suggest could you it this asking price so...”	I-11
	Negotiating with data marketplaces on behalf of providers	“Actually, what you do, you have to negotiate with this individual platform”	I-01
	Support onboarding processes	“Then, then customers 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 [company] to further sell this kind of metadata to the market.”	I-02

*Meta-platform archetype: One-stop-shop*

Second-order category	First-order category	Excerpts	ID
Standardizing	Creating API standardization	So if I'm sharing my data and uploading it so some let's say syntax how the API should be structured or, uh, how should the business definition should be structured?	I-07
		“Yep. So there's 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
		“But maybe you're right, standard interfaces that make it as easily as easy as possible for initiatives to connect to them.”	I-17
	Providing centralized certification	“Now the interesting thing is of course is that when you're 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
		“Who certifies this and maybe there's a chain of certificates that certifies this.”	I-16
	Providing shared-billing systems	“So it would be in my ideal world, whatever process is necessary for payment is also machine readable. So if some new customer let's say you want to now harvest this [provider] data, [provider] hypothetical data set to just go to the data set, you get a machine readable thing that you can plug into your computer to connect to them and a machine readable thing that you can put into let's say, your finance software, so that it knows, okay, every time you do a search you have to send these guys one euro cent and every time you download something, you have to send these guys one	I-16



Second-order category	First-order category	Excerpts	ID
		euro and that is the kind of automatic of course that you realize what this is up front it's below the billing is transparent and so on.”	
		“They would also be billing mechanisms, things that we actually dream of in [a data market] as well, but I'm not sure how realistic they are.”	I-17
		“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
Regulating	Creating self-regulation	“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-14
	Complying with updated top technologies	“Right, so yeah, so as a hub it has to be, you know, very agile, and compatible with several top technologies in the markets.”	I-05
		“Yeah. So yeah, this this would be kind of my idea. And yes, something that would be kind of important, I think is that this be adaptable. Yeah. So that it there. There will for sure be new technologies coming up all the time. And they have to be, yeah, one should be able to plug these new technologies in there.”	I-19
Sharing	Sharing features between marketplaces	“Yeah, because we maybe we can have features that other data markets does not have. And they could benefit from us, linking both customers, you know. What they cannot provide we can provide right? And the other way around. Maybe we are not covering some feature that we discovered are relevant for our customers. And they can find them in other data markets.”	I-19
	Sharing computational resources	“So if you really want to enforce these usage policies, you need a whole stack of computing infrastructure that starts with hardware.”	I-16
		“Uh, 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
Experimenting	Programming ecosystem	“Programming ecosystem, maybe a development ecosystem where these kinds of experiments are also possible. And then also we're in the future machine learning models can be exchanged.” “Yeah, so that there are there are there is kind of like a sandbox environment or a programming ecosystem as well.”	I-17