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Digital Business Ecosystems: Organizational Model, Roles, and Governance Towards Flexibility

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Abstract

Digital Business Ecosystems (DBE) enable digital platforms to support companies' collaboration in shared markets. This novel organization form facilitates and accelerates exchanges, which modifies B2B relationships. The main question is how to enable flexibility of these relationships when data sharing needs to expand the traditional supply chain roles of "supplier" and "customer"? To answer this question, we conducted several interviews to collect data from the French banking industry to build a future organizational model of DBE detailing the extended roles and rules of cooperation. These roles imply reciprocal data sharing from customers to suppliers in exchange for incentives or remuneration. Firstly, we propose a high-level organizational model of DBE, including the list of functions, actors, and requirements. Secondly, we conceptualize the DBE participant as an actor being both a customer and supplier simultaneously. Third, we propose a matrix to enable governance for digital business ecosystems. We contribute to flexible systems management by building a high-level organizational model detailing the roles and governance rules. We believe this model will support the fair distribution of resources, respect common and individual goals, and attain more sustainability with a concentration on the core processes of actors.

Keywords:
Digital Business Ecosystem; Digital Platforms; Governance; Organizational Model

1. Introduction

Over the past 20 years, digital platforms and other infrastructures for digital transformation made traditional industries interconnected and dependent on data sharing. It implied the formation of business ecosystems which enable companies to produce products and services collaboratively and share the gains [9, 19]. These changes drastically increase value chain complexity and value creation opportunities. Due to differences in companies' business models, there is a need to standardize cooperation principles and data sharing in an operational model that combines divergent approaches to create and capture value.

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During this study, we describe how organizational models should be defined to improve flexibility in Digital Business Ecosystems (DBE). A DBE represents a socio-technical environment of individuals, organizations, and digital technologies with collaborative and competitive relationships to co-create value through shared digital platforms [24, 28]. In these digital environments, the role of participants evolved beyond the conventional bi-polar value exchange between customer and supplier. Now suppliers and customers generate, aggregate, and sell resources, such as services, data, and even waste. Some resources, such as data, never existed in the current volumes and varieties; this creates new opportunities to pay for data services. For companies, data-driven value propositions allow better market positioning and customization of offers; therefore, they are ready to pay or exchange services for data. For instance, the introduction of platforms in healthcare enabled changing patient segments, decision-making roles, and patient care interactions [10]. These changes have reshaped conventional resource allocation and contributed to sustainability. At the same time, capturing and monetizing the disruptive potential of data sharing is getting harder [3], especially in conventional regulated industries, where many attempts to build ecosystems fail [22, 23]. All these aspects are related to DBE governance. As governance issues remain unsolved [28], this paper contributes to the organizational model of DBE.

Standardization of the organizational model brings guidance in complex, uncertain business environments. Most current value chain members, Small and Medium-Sized Enterprises (SMEs), particularly need guidance to operate in digital business ecosystems. Additionally, openness and collaboration between companies are needed; thus, open organizational standards are required [26]. The existing developments include: (a) GAIA-X - a European Project for Data Infrastructure between France and Germany to interconnect data services, providers, and consumers, and all the IT infrastructure required to secure access and data sharing in compliance with European regulations; (b) The RAMI 4.0, Reference Architecture Model Industry 4.0 that supports a holistic view of manufacturing enterprises across Germany, China, Japan, and India. RAMI 4.0 ensures that all participants share a common perspective and develop a common understanding. Among the unresolved issues are resource-sharing principles [6], agreement management [2], and roles definition [11]; (c) International Data Spaces initiative offers a standardized architecture and interfaces that guarantee data sovereignty [21]. This work specifies the technical level and focuses less on the existing discussion on flexibility for the DBEs by data sharing at business levels.

However, the existing works do not provide an organizational model that binds suppliers and customers by value-creating and value-capturing links. An organizational model describes an organization's objectives and structure in terms of roles, norms, relations between roles, and interactions between roles [30]. It provides a holistic view of owned datasets, use cases for the specific goal, best practices, and governance rules to derive value from data. Based on GAIA-X and RAMI 4.0, this organization model can inform a joint generation of products and services using a pool of companies, as well as rules and roles for structuring their collaboration and, finally, development, integration, and operation of the relevant technological systems [13]. Therefore, the suggested open organizational model can guide any company with the standards and facilitate their entry into DBE.

Although the organizational model of supply chains exists [1], to the best of our knowledge, existing works do not specify any organizational model for Digital Business Ecosystems that embraces the flexibility challenges. Moreover, it does not support such changes, as the vertical collaborations along supply chains are long-term, and information sharing is restricted. Thus, despite the multiple papers written about data ecosystems and the role of platforms in their success, we claim the existing research has spent a limited effort on deriving the organizational structure that can guide firms, particularly SMEs, with the standards and facilitate their entry into DBE. Therefore, we formulate our research question (RQ) as: *'What is the organizational model for a flexible digital business ecosystem governance?'*

To achieve this goal, we conducted multiple case studies in the French digital banking sector using interviews. In our running example, the largest banking ecosystem in France tries to avoid central governance, central data storage, and a central data quality process to improve data sharing between their business units and partners' upstream supply chains. The goal is to let each business partner generate, curate, and exchange data. The global data enhancement would be provided using the correct granularity and quality level for each contextualized data, which will aid in making business processes more efficient. Thus, we contribute to the existing discussion about the future organizational model of DBEs to resolve these issues and level theoretical foundations to offer a new vision of the relationships inside DBEs. Such a model should comply with the expectations of large-scale companies, like original equipment manufacturers or international banks, and at the same time, suites the majority of companies in current value chains – SMEs and individual participants.

Section 2 introduces the theoretical background of our research. In Section 3, we present our research process. Section 4 is focused on the obtained results. Finally, we conclude in Section 5.

2. Background

Digital platforms and business ecosystems [28, 24] are up-to-date topics that have produced many research papers during the last decade. Several reviews were made, to sum up, the existing work [24, 27, 20]. However, only one existing work focuses on the governance of digital platform ecosystems [20]. This literature review details different issues related to governance, including meta-organization design and coordination mechanisms. However, to the best of our knowledge, none of the works concentrates on DBE's organizational models.

Agile enterprise architecture has been proposed to satisfy the current demands for flexibility, agility, and customer responsiveness in an enterprise [8]. Several approaches for larger companies towards agility have been proposed, for example, real-time business processes generation [8], using context awareness [7], 'On-The-Fly Computing' [14], data-driven customer care [15] or outsourcing business models [16]. All these approaches called for agility and flexible management in large-scale business systems through consistent value creation via flexibility. Still, the data processing costs to clear, standardize, and augment data reach 80% of the total cost [21].

In addition, [12] claims to address foundational elements that will become very important for successful platform ecosystems. Data exchange is addressed from an economic viewpoint and the perspective of data re-purposing on the receiving side. Similar issues can occur when different business intelligence/AI algorithms and application concepts are co-engineered or co-used collaboratively without mutual understanding. [4] defined data-related governance issues. Particularly, they noted resources & capabilities, such as data ownership, gathering consent for data processing, and understating data lineage. In addition, data governance should address the issues of data security, confidentiality, and ownership which are considered "obstacles to the exchange of data among distributed IoT networks and applications".

With regard to roles in DBE, [32] defined the roles across two levels of governance institutions: fundamental institutional logic and specific rules based on these logics in various organizational fields. This work focuses on business ecosystems appearing on the Internet. [18] defined roles for such ecosystems: platform owner, platform provider, application or content provider, i.e., contributor, and user of the provided content and integration of only legal rules into the design of digital platforms. [29] suggest classifying roles inside DBEs with corresponding responsibilities.

Several works deal with rules in [25] defined the rules for internal governance in virtual words. In a broader study of factors based on the costs of relationships between platforms and complementors, [5] defined rules as a set of causal conditions for platform governance forms: control (clan control, input control), decision rights partitioning (centralization of decision rights), and architecture (app decoupling and standardized interfaces). According to [32], the rules in digital business ecosystems are the institutionalization of open governance logic and rules.

Despite the multiple papers written about ecosystems, we claim the existing research has spent a limited effort on deriving the organizational structure that can guide firms with the standards and facilitate their entry into DBE. Particularly, the role of the organizational model for data sharing in digital business ecosystems was out of the scope. We formulate it as the following research question (RQ): *'What is the organizational model for a flexible governance in a digital business ecosystem?'*

3. Research Method

To conduct our study, we followed 10 steps depicted in Figure 1 as a process. We want to understand and improve interactions between companies that communicate within a market sector. With the arrival of Industry 4.0 and the development of digital technologies, interactions became more diversified and complicated to handle. Especially, the situation is difficult for SMEs with restrained financial and human resources. To improve and facilitate companies' interactions, we should understand how new technologies impact organizational aspects. It is the entry point for our research method.

1. **Conduct a Preliminary Literature Review:** To answer this question, we undertook an initial literature review with the main keywords related to DBE, organization, and governance, which suggested a lack of an organi-

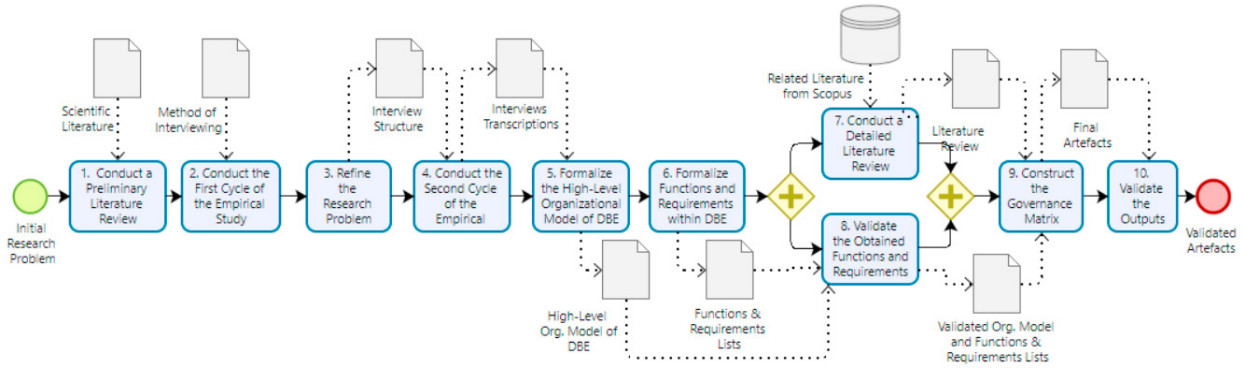

Fig. 1: Followed Research Process.

zational model for DBE. That was a trigger to conduct an empirical study to identify elements to stricture the organizational model of DBE.

2. **Conduct the First Cycle of the Empirical Study (the first interview):** We established the initial contact with the French banking industry and interviewed a higher-level executive to identify the first set of trials for the organizational model. To conduct this study, we used a paper-and-pencil interview procedure [17]. The interview was open, with several questions indicating the main directions of the study. These questions were grouped into two parts:

   - Part A. How is organized the supply system: current procurement/supply network, future procurement/supply ecosystem, and existing enterprise architecture supporting the procurement/supply ecosystem?
   - Part B. How is the Industry 4.0 integration carried out in the supply system: horizontal integration, vertical integration, end-to-end engineering?

   The interviews were held in French and, afterward, we translated the answers into English. A detailed list of questions could be provided on request. This first interview confirmed the need to redefine traditional roles for the organizational model of DBE and gave elements to detail the main research question.
3. **Refine the Research Problem.** Based on the first results, we defined four research sub-questions (SRQ):

   - RSQ1. How could an organizational model of DBE be organized?
   - RSQ2. What are DBE's functions regarding goals, rules, data, processes, and products/services?
   - RSQ3. What are DBE Actors' functions regarding goals, rules, data, processes, and products/services?
   - RSQ4. What are DBE Actors' requirements regarding goals, rules, data, processes, and products/services?

4. **Conduct the Second Cycle of the Empirical Study (three more interviews):** To select more interviewees for this cycle, we used the following criteria: (i) the banking sector (known for quick adoption of platform strategy and digital ecosystem growth), (ii) high responsibility position, (iii) post in enterprise architecture (field requiring to have a global vision of the company and its interactions with its network, (iv) experience at least of 10 years in the field, and (v) practice of new digital technologies in the job. As a result, we received three positive answers in four attempts (I1, I2, and I3). We used the same approach as for the first phase, except for the list of questions that corresponded to research sub-questions with open answers proposed to the interviewees. The semi-open interviews were conducted in a paper-and-pencil manner[17]. The interviews were also in French with further translation into English. As a result, we started to collect requirements to build and evaluate the artefact of this research – an organizational model of DBE.
5. **Formalize the High-Level Organizational Model of DBE:** Based on the obtained results, we constructed the first version of a high-level organizational model of DBE.

6. **Formalize Functions and Requirements within DBE:** We established lists of DBE functions, DBE actors' functions, and requirements that actors may have inside a DBE.
7. **Validate the Obtained Functions and Requirements:** We validated the obtained DBE and DBE actors' functions and requirements. For this purpose, we formulated a set of hypotheses and presented them to the three interviewees to gather their comments and suggestions.
8. **Conduct a Detailed Literature Review:** To validate the findings, we searched the relevant research papers using Scopus API containing a very large set of scientific bases (Elsevier, IEEE, Springer, ACM, etc.). First, we applied the following search string [governance AND digital AND (ecosystem OR platform)] to paper titles. We obtained 28 papers pour the period from 2006 to 2022. Then we used two exclusion criteria: papers from non-IT fields (we excluded, for instance, papers from medical, political fields) and papers before 2010. We obtained 18 papers, and after reading the abstract, we excluded one out of scope. After a detailed analysis of the selected papers, we confirmed the need for a new organizational model.
9. **Construct the Governance Matrix:** Based on the previous step results, we organized the functions and requirements together with the gathered comments into a governance matrix summarizing them following the two levels of DBE (DBE and its Actors) and with structural elements (goals, rules, data, processes, and products/services).
10. **Validate the Outputs:** Finally, we showed the obtained governance matrix to three interviewees for the final validation.

4. Results

A digital business ecosystem is a dynamic network of organizations (actors) that cooperate to create more value and later compete to capture value in different channels. Each organization is a system; thus, an ecosystem is a system of systems where each component system has its own goals and contributes partially (%) to complete the whole ecosystem's goals. In addition, strategies are also shared. DBE actors (participants) are both customers and suppliers. Customers become suppliers as they provide information about their needs, habits, and financial data; suppliers become customers of these data; each participant of an ecosystem is considered the same way; we call them actors of an ecosystem.

The first interview with the executive confirmed the need to redefine the traditional roles and gave several trials for the future organizational model. As a result, we started to collect requirements to build and evaluate the artefact of this research – an organizational model of DBE. In addition, this interview allowed us to identify a set of concepts to refine our research problem: from one side, the distinction between two organizational levels (DBE and DBE actors) and, from the other side, structural elements (goals, rules, data, processes, and products/services) taking part in the organizational relationships within a DBE.

Based on the second round of interviews, we developed: (i) a high-level organizational model comprising two levels: DBE and DBE actors; (ii) three lists of DBE and DBE Actors' functions and requirements; and (iii) a governance matrix, which qualifies the relationships between a DBE and DBE actors and between DBE actors themselves. We also validated the established hypotheses.

4.1. High-Level Organizational Model of DBE

The DBE organizational model comprises two structural elements: DBE and DBE actors (Figure 2). A DBE is viewed as a system of systems where each component (i.e. DBE actor) has its own goals and partially contributes to the whole ecosystem's goals. It requires a multi-layer space for mutually exchanging products/services, data-sharing processes, and different resources, including data. Those constitute a multi-layer space.

We consider an actor in a DBE as a mixture of a customer and a supplier. For such an actor, data generation and sharing are regulated with the explicit permission of their owner. Indeed, the traditional vision is associated with a set of problems. For example, several data are ill-managed: personal data like clients' addresses are not always up to date in the bank database, and clients are the best to give them, not the bank; other data are used without the explicit permission of their owner (for instance, clients' consumption habits), a bank may use these data for its products or could eventually be sold to another company, that raises the regulatory need for benefits sharing. Thus, each DBE participant is considered the same way; we call them actors of a digital business ecosystem. An actor could be any

stakeholder (before a supplier, a customer, an employee, or a financial organization), but now each actor could have several roles at the same time and share details differently (being 'white box', 'grey box' or 'black box').

Thus, the structure of obtained high-level organizational model includes two levels: DBE and DBE actors who are involved in both competition and cooperation ('coopetition' from [31]) in a multi-layer shared space comprising products and services, processes, and data (and other resources) (See Figure 2).

4.2. DBE and DBE Actors' Functions and Requirements

Following data collection and ecosystem requirements, we define the following DBE functions:

- DBE handles data synchronization and integration.
- DBE handles process synchronization and integration.
- DBE establishes rules (like GDPR) and communicates them within a network, checking compliance with the rules' application.
- DBE has goals and integrates actors' goals.
- DBE guarantees that products and services are available for all actors and that they are compliant (concerning security and other requirements).

An actor could be any stakeholder (before a supplier, a customer, an employee, or a financial organization), but each actor could have several roles simultaneously. Actors could be black, gray or white boxes (like in social networks, people share different levels of details). Every actor has a part of the multi-layer space, a kind of projection of this space. We define the following DBE actors' Functions:

- The actor manages/stores/manipulates/shares his data
- The actor focuses on activities bringing him the margin
- The actor has goals and contributes to ecosystem goals
- The same actor produces and consumes products and services (any more considered as just supplier or consumer)
- The actor respects rules identified within a DBE

Based on the previous iterations, we defined the following requirements for DBE:

- Data are managed/stored/manipulated by their owner (e.g., the customer's address should be stored by a customer, not by the bank)
- All concerned actors should communicate data management rules (including GDPR)
- Each actor should focus on activities it makes a margin on; other activities should be externalized
- The ecosystem comprises actors' integration and synchronization of data
- The ecosystem should be based on the actors' integration and synchronization of processes
- New requirements of Personas involved in/representing actors should be considered (regarding the quality of the access to services, design requirements, and data delivery)

We gathered different comments from the three interviewees to illustrate these functions and requirements (See Tables 1, 2, and 3). These tables show that most suggested hypotheses were confirmed: 86,7% for DBE functions, 93,3% for DBE actors' functions, and 100% for DBE requirements.

4.3. Governance Matrix

The Governance matrix adds insights useful to qualify the relationships between a DBE and DBE actors and between DBE actors inside a DBE. First, we defined the roles on two levels, corresponding to actors and the whole ecosystem. Next, these roles are detailed regarding governance functions (goals and rules) and the layers of the digital space (data, processes, products/services). Finally, we organized the identified elements within a governance matrix (See Figure 3 for details).

Table 1: Interviewees' feedback on DBE Functions.

Hypothesis	DBE Function	Validated by	Citations
DBE-F1	DBE handles data synchronization and integration.	2/3	"Suppliers should change their way of working. It is about direct suppliers, but it propagates to indirect suppliers. We should share the data architecture principles further away than a simple collaboration. Suppliers of Data Hubs, for instance, should tell/communicate about their evolutions in advance. API should be consistent with providing this kind of integration." (I1) "Internal directions manage much confidential information in a centralized way. The ambition is to have open data. From the ownership point of view, data is open and still managed by the bank: rates and prices, economic actors' financial behavior, and money-related analysis. It is important to have a global view." (I2)
DBE-F2	DBE handles process synchronization and integration.	2/3	"The SAFe framework brings together and synchronizes different processes, including inter-organizational processes." (I2)
DBE-F3	DBE establishes rules (like GDPR) and communicates them within the network, checking compliance.	3/3	"Thanks to the GDPR law, it is necessary to supervise the way of working of contractors, which implies the decisions of architecture. Thus, it is necessary to digitalize processes and data, which implies the data architecture." (I1) "SAFe Big picture help to supervise IT governance including inter-organizational links" (I2) "MIF2 expresses some requirements to comply with about data transparency" (I3)
DBE-F4	DBE has goals and integrates actors' goals.	3/3	"A data scientist (in the open data room) should have the role to help to identify how to use data depending on goals, define what is expected from data, what for all is it." (I2) "Everything is driven by goals, main goal – profitability, how to achieve this?" (I3)
DBE-F5	DBE guarantees that products and services are available for all actors and that they are compliant (regarding security and other requirements).	3/3	"A DBE should have best practices and norms used by all parts. For external contractors, a contractual frame should be defined with general conditions. There are general SLAs and individual SLAs, so it becomes complicated. Security standards/rules should be the same3. Using the same framework, like SAFe, timelines, principles, and rates are shared, it is clearer, more transparent, and easier to follow." (I2)

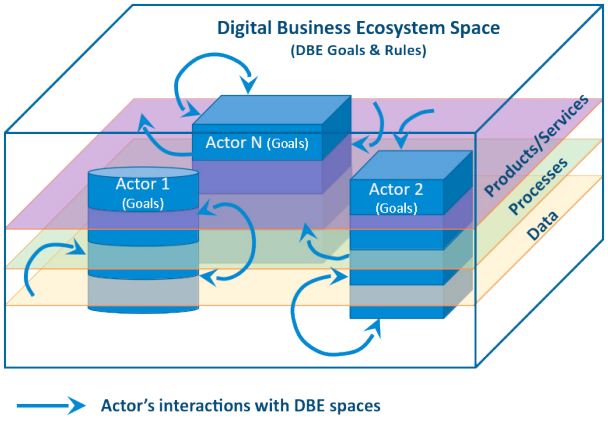

Fig. 2: DBE High-level Organizational Model

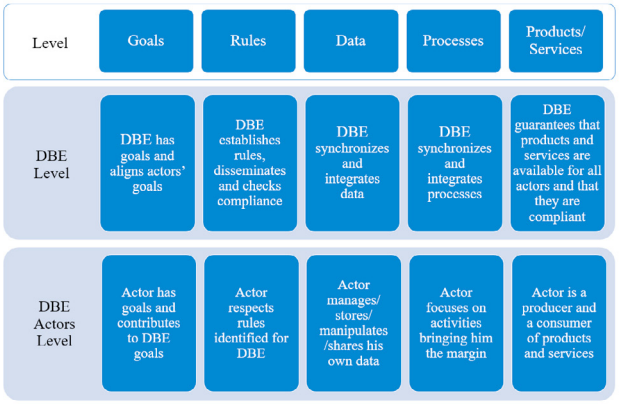

Fig. 3: DBE Governance Matrix

A DBE is viewed as a system of DBE actors having goals compliant with DBE goals. This enables a multi-layer space facilitating the mutual exchange of products/services, processes, and different resources, like data. Relationships between customers and suppliers in DBEs are recursive, as each participant may simultaneously be a customer and a supplier. Such turnover puts DBE actors in competition and cooperation by co-creating and co-consuming products and services, processes, and resources, respecting established rules, and attaining the goals of different participants.

Table 2: Interviewees' feedback on DBE Actors' Functions.

Hypothesis	DBE Actor Function	Validated by	Citations
DBE-A-F1	The actor manages/stores/ manipulates/shares his data	3/3	"It is very disruptive, but it represents a real opportunity to offload a part of the data management. It reduces the risks and reduces the costs, which are enormous." (I1) "It could resolve the current problems. There is a business unit that manages all reference data, but each business unit has its data. A huge problem is data duplication. Data are numerous; often it is unclear, the data source, how it was transformed, sometimes clear, sometimes not at all." (I2) "Golden source should be defined, who manages data, how transformed. Data lake is a good idea, but it is difficult for an existing organization, for big enterprises; centralization is good but limited" (I2) "Yes. Two kinds of data management should be specified: 1. functional (who has the privilege to manipulate data, to see details or not); 2. technical (cloud storage, security aspects)" (I3)
DBE-A-F2	The actor focuses on activities bringing him the margin	2/3	"Yes. When you build an IS, instead of having your entire automated processes for all functions, you will think of automating in functions, just the services that will bring something to the enterprise. The rest, you are going to pick them somewhere else." (I1) "In a supply chain, processes are not homogeneous. Today enterprises should describe processes as the first step. First, it is not sufficient. Second, the decision should be made on which part of IS the company does the margin." (I1) "Yes, it is in line with current evolution: most solutions are outsourced, like open ERP, which is simpler and faster. However, still several problems, for instance, LCNC (low code, no code) development, new recent technologies, etc., are considered "shadows" with no standards; many companies have started to use it, but data security issues are not solved, or else lack centralization." (I2)
DBE-A-F3	The actor has goals and contributes to ecosystem goals	3/3	"Each action should be aligned with the goals of the whole" (I2)
DBE-A-F4	The same actor produces and consumes products and services (any more considered as just supplier or consumer)	3/3	"Clients of bank become a source of data (address, but also consuming habits he could be a source of advertising)" (I1)
DBE-A-F5	The actor respects rules identified within a DBE	3/3	"Yes, should follow contracts, like SLA and any kind of contracts (consultant contract with general conditions in addition to job and payment)" (I2)

5. Conclusion

The paper is responding to the need for an agile and collaborative approach to effective governance to enhance management in digital business ecosystems. In our vision, flexibility is attained by a new definition of roles inside DBE. This new vision simplifies the organization by distinguishing only two levels: DBE and DBE actors. The actors can combine different roles (for instance, supplier and customer at the same time). The resources including data are available at their sources, providing direct, more efficient, and more flexible access. Actors also focus only on the activities (process parts) on which they are specialized and integrate other activities from other actors. Actors' relationships within a DBE allow them to find complementary products without the necessity to invest and develop additional capabilities. Actors cooperate between them in a more flexible way, as each of them has its own very specific scope and uses the opportunities existing in DBE. To ensure the good functioning of this system, the DBE should synchronize data and processes, establish rules to be respected by all participants, and guarantee quality, compliance, and security. We suggested a governance matrix that summarizes the established functions and rules and organizes them according to two levels (DBE and DBE actors).

The suggested model, functions, and governance matrix would have a high potential for practical implications, especially for SMEs perceived as the actors in DBEs. Applying the suggested rules would allow optimizing resource distributions, increase efficiency, and improve flexibility inside DBEs. Thus, we contribute to the existing discussion about the future organizational model of DBEs to resolve these issues and level theoretical foundations to offer a new vision of the relationships inside DBEs. Such a model should comply with the expectations of large-scale companies,

Table 3: Interviewees' feedback on DBE Requirements.

Hypothesis	Requirement	Validated by	Citations
DBE-R1	Data are managed/stored/manipulated by their owner (e.g., the customer's address should be stored by the customer, not by the bank)	3/3	"Until now, ISs were endogenous (that is to say, conceived, managed and maintained by enterprises. Thus, they controlled the entirety of their IS and the required data. For this reason, we were collecting all data about clients, collecting all data about suppliers, and managing all updates and so on from beginning to end. Moreover, when a client needed information, the enterprise could give it from beginning to end. Several things change: first, data evolution in several axes: new possibilities for data access and storage that we had not before; second, as clients, we have all requirements that we had not before, and the main requirements we have are, for instance, we consider as unacceptable that the enterprise asks several times for the same thing. This can be avoided if each client manages his own data" (I1) "Not always, contracts are signed to use data, like GAFA uses personal data. Maybe this new solution you suggest will allow you to pay for usage; it should be the first step. Potentially very interesting" (I2) "Not relevant for each institution. Most of the time, data are built by users. Relevant for retailers, as they can have their politics." (I3)
DBE-R2	All concerned actors should communicate data management rules (including GDPR)	3/3	"Transparency is important. SAFe creates the ecosystem, generates rules. SAFe is be used for a consortium" (I2) "Two levels of standards: industry level standard (e.g., petrol) country-level standards independent from companies" (I3)
DBE-R3	Each actor should focus on activities it makes a margin on; other activities should be externalized	3/3	"Agree, like in "Pumping method": how to concentrate on the important things, and other outsourced" (I2) "Excellent, one concern, it is interesting as it helps every actor to focus on activities with the most value and outsource additional things. There is a problem of confidence; the same provider is working for competitors, data protection. Outsourcing is good." (I3)
DBE-R4	The ecosystem comprises actors' integration and synchronization of data	3/3	"SAFe assures general goals and synchronization of data" (I2) "Very good, data and actors interact, so very good." (I3)
DBE-R5	The ecosystem should be based on the actors' integration and synchronization of processes	3/3	"SAFe plus general processes shared between all parts allow having a global, transversal vision." (I2)
DBE-R6	New requirements of Personas involved in/representing actors should be considered (regarding the quality of the access to services, design requirements, data delivery, etc.)	3/3	"SAFe allows accelerating the agility and reactivity of different entities." (I2) "Power and interests should be combined to make decisions." (I1)

like original equipment manufacturers or international banks, and at the same time, suites the majority of companies in current value chains – SMEs and individual participants.

The application limits the current study to the banking sector; thus, in our future work, we will validate this proposal in the context of SME inter-organizational supply networks. In the long term, we aim to use the organizational findings of the current study to develop an enterprise architecture-based approach providing a structured framework to help DBE actors (especially SMEs and individual participants) to benefit from DBEs. Future research should highlight the organizational model of DBE for other flexibility scenarios and provide validation of its functioning with the DBE governance matrix.

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