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Monitoring B2B Industrial Digital Platforms in Europe

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Table of contents

List of Figures

List of Tables

Introduction

Objectives

This report investigates the status of B2B industrial digital platforms in terms of their emergence, development and distribution and underlines their relevance in fostering the process of digital transformation across industries, as well as their role as a fundamental enabler of the data economy in Europe and beyond. The report presents and profiles the main players that are currently active in the digital platform space and analyses the key dynamics underpinning the supply and demand of B2B industrial digital platforms, as well as the main use-cases where these are currently being used. In the last part of the document, the barriers that are currently hindering a further development and deployment of B2B industrial digital platforms in Europe are reviewed with the aim of providing an initial input for further action in terms of business and policy-making intervention.

Methodology Approach

This report draws from extensive secondary research conducted on external sources as well as on existing research previously carried out by the Consortium partners. In particular, various IDC sources from research carried out by IDC Manufacturing Insights[1] and other IDC units have been used. The results of the 'Advanced Technologies for Industry Survey' that was carried out between July and September 2019 have been leveraged for the analysis included in this report.

Structure of the Report

The report is structured along the following sections:

- Section 1 provides a comprehensive background and context on B2B industrial digital platforms, offers a workable definition of these platforms and examines their relevance and importance vis-à-vis the ongoing phenomena of digital transformation and data economy.
- Section 2 introduces a top-level mapping of industrial digital platforms while dealing in particular with the supply-related dynamics thereof and offering an overview of the main players that are active in the industrial platform space.
- Section 3 deals with the demand-related aspects of B2B industrial digital platforms in Europe as well as with the benefits perceived by platforms users today.
- Section 4 examines the main barriers that are still hindering the evolution of B2B industrial digital platforms in Europe.

[1] https://www.idc.com/getdoc.jsp?containerId=TEA002928

Background and Context

What are B2B Platforms?

Digital platforms have become one of the principal ways of organising a wide range of human activities, including economic, social, and political interactions (Kane, 2014) (Asadullah & Faik, 2018). As a result, the increasing adoption of digital platforms to organise economic and social activities has led to growing interest in research on this topic and has put the spotlight on their economic and business relevance.

The platform concept, however, is not new. For many years, large manufacturers and industry sectors as a whole have achieved efficiency gains by developing common working frameworks and shared environments. This is the case of the automotive industry, where platforms have long formed the basis for several different car models. Digital technologies are now making it possible to extend the industrial platform concept to uncharted territories. New business opportunities can in fact be targeted through the creation of virtual buyer-and-seller communities, thus facilitating interactions of users with diverse but complementary interests. Furthermore, enterprises that are willing to expand their customer base, or are looking for new markets, or are interested in selling specialised, niche products, may find new opportunities by using online platforms. At the same time, platforms offer new ways of maximising efficiency and improving profitability (Duch-Brown, 2017) and are therefore gaining in importance for their economic brokerage and intermediation services – at both the business-to-consumer (B2C) and business-to-business (B2B) levels. The platforms' leadership role in today's economy, though, would not have been possible without the fundamental contribution of information technology (IT). Today, the platform concept spans software development techniques, entire technology stacks and data ecosystems, software bundles and cloud computing models (such as the platform-as-a-service [PaaS] model), and entirely new digital business and industry-specific ecosystems. Its relevance for the business and the economy is rapidly growing, driving the rise of the platform economy, where value added is created by the application of big data and analytics technologies, increasingly powerful cognitive computing capabilities, and ubiquitous access.

From a theoretical point of view, Koh and Fichman have defined digital platforms as a "two-sided network that facilitates the interactions between distinct but interdependent groups of users" (Koh & Fichman, 2014). In a more practical sense, a digital platform is a technology-enabled business model that creates value by facilitating exchanges between two or more interdependent groups. Platforms also enable companies and organisations alike to share information to stimulate collaboration and enhance the innovation potential of products and services. By connecting two or more sides, the platform ecosystem generates powerful network effects whereby the value increases as more members participate (Rochet & Tirole, 2003). Platforms have long played a key role in the IT industry. More specifically, from a B2B point of view, platforms can be defined as *virtual environments facilitating the exchange and connection of data between different organisations through a shared reference architecture and common governance rules* (IDC)[2]. By linking different actors that are interested in sharing information in the form of data, industrial digital platforms constitute a composite business ecosystem combining players from disparate backgrounds, thus fostering the creation of new data-driven services and innovative business processes.

[2] G. Cattaneo, G. Micheletti and L. Veronesi (IDC) 28TH July 2016. "European Data Market SMART 2013/0063. D3.10 Industrial Data Platforms – *Key Enablers of Industry Digitization*." The document is one of a series of in-depth analysis focusing on the development of the data-driven economy in Europe based on specific case studies by sector and/or by technology. It constitutes the deliverable D3.10 of the study "European Data market", SMART 2013/0036 entrusted to IDC and Open Evidence by the European Commission, DG Connect, Unit G3 – Data Value Chain.

The Relevance of B2B Platforms

Over the next decade, one of the most prominent aspects of digital transformation (DX)[3] will be the creation of a vast, interconnected ecosystem enabled by industrial B2B platforms. Research conducted by the World Economic Forum's Digital Transformation Initiative (DTI) indicates that digital platforms could unlock $10 trillion (approximately € 9 trillion) of value for business and wider society over the next 10 years. McKinsey[4], in turn, has suggested that as much as $60 trillion (approximately €55 trillion) in annual revenue – making up 30% of the global economy – could be redistributed across the economy by digital platforms in five to six years' time worldwide. This "platform revolution" will eventually reshape how industries are defined, how ecosystem participants interact, how stakeholders' needs are met, and how value is created and shared. Yet this revolution comes at a price, as organisations are already starting to struggle with the new business models that platforms will eventually impose. While some business leaders are already taking decisive action to position their organisations for success in this new environment, many others are less certain of their strategy and are starting to lag (World Economic Forum, 2017), thus reinforcing the intrinsic imbalance that the platform economy may generate.

The Need to Act Now

The growing process of digital transformation and the digitisation of virtually every sector of the economy has made consistent, high-quality customer interactions a truly competitive differentiator, irrespective of the channel in use for the actual interactions. As such, B2B companies need to adjust accordingly and fully embrace the phenomenon of digital platforms (Catlin, Harrison, & Stanley, 2016). For this reason, the impact of digital platforms has not only drawn the attention of the business sector, but also of national and international policymakers and regulators.

Indeed, policymakers can play an important role in unlocking the potential in B2B platforms and harnessing new business opportunities for industrial development. Policy measures can range from awareness raising, guidance, and financial support to regulatory steps, all of which contribute to enhancing the European data economy. The key obstacles that hinder companies developing joint B2B digital platforms are the uncertainty about data ownership, lack of interoperability, data standardisation, as well as security considerations. Regulating B2B data sharing can help clarify data ownership and provide data protection (The European Commission, 2018)[5]. Some Member States have started to introduce national legislation, such as France's law on platform fairness and its regulations on intellectual property rights and data protection, which manage the process of data sharing and give guidance on liability for bad quality data. More recently, Germany has also turned its attention towards digital platforms. On the 30th October 2019, the Federal Government of Germany released the so called "Dortmund Declaration"[6] where the country's digital policy and objectives in terms of data and platforms for Germany's digital future were openly outlined. In essence, Germany pledges to endow its citizens, industry and public sector with a comprehensive control over their data ("Data sovereignty") and with access to secure cloud solutions as crucial prerequisites for platforms that can be truly "Made in Europe". It also commits to expand Germany's gigabit network to make it a true basis for the country's platform economy and to work on a framework that particularly facilitates the emergence of services and solutions designed to make citizens', and companies' everyday tasks easier and fosters the new business models that are the basis of the platform economy.

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[3] The concept of Digital Transformation has been the object of renewed interest over the past few years. Several definitions of digital transformations have been put forward but, in general, they all refer to the process of using digital technologies to create new – or modify existing – business processes, culture, and customer experiences in order to meet changing business, market and regulatory requirements. According to IDC, Digital Transformation (DX) means applying new technologies to radically change processes, customer experience, and value. DX allows organizations to become Digital Native ventures that support innovation and digital disruption rather than enhancing existing technologies and models (https://www.idc.com/itexecutive/research/dx).

[4] Venkat Atluri, Miklós Dietz, and Nicolaus Henke. (January 2018) Digital/McKinsey: Insights "Winning in digital ecosystems" https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/Digital%20McKinsey%20Insights%20Number%203/Digital-McKinsey-Insights-Issue-3-revised.ashx

[5] European Commission (2018). Study on data sharing between companies in Europe

[6] https://www.de.digital/DIGITAL/Redaktion/EN/Dossier/digital-summit.html; https://www.behoerden-spiegel.de/2019/10/30/die-dortmund-declaration-der-regierung/

The EU plays an important role in providing consistency between the relevant national regulatory frameworks and promoting a solid European approach to digital platforms and the associated, strategic aspect of data sovereignty. While the GDPR has introduced a general right to data portability for personal data related to individuals, the European Commission is assessing whether introducing a general right to data portability for non-personal data could serve as a means to enhance competition, stimulate data sharing, and avoid vendor lock-in. The introduction and further adoption of standardised APIs (Application Programming Interfaces) would also offer platforms the opportunity to exchange data with others (EBA, 2018). The European Commission additionally adopted its proposal for a regulation 'on promoting fairness and transparency for business users of online intermediation services' in 2018, which aims to regulate the relationship between platforms and businesses by imposing a number of transparency obligations.

As back as in 2018, the importance for Europe of keeping its leading position in the B2B digital industrial platform landscape was clearly expressed. In a workshop organised by the European Commission[7] and which brought together a panoply of stakeholders across industrial value chains, the need for EU-level cooperation, as well as for accelerated adoption of B2B platforms at the European level was pointed out in very clear terms. The workshop further stressed the requirement for intensified collaboration between European commercial platform providers and European community-driven initiatives, such as International Data Spaces (IDS), FIWARE, and the Industry 4.0 Administration Shell. Indeed, Europe traditionally holds a privileged position in some of the industries in which B2B digital platforms are most widespread, such as the manufacturing and the energy sectors. With the ongoing process of digital transformation, Europe should not only retain and extend such leadership, but also lead and fully capture the business opportunities that emerge from the provisioning and the deployment of technologies to support such transformation (Lazaro, 2018).

In line with these ambitions, in February 2020, the European Commission launched a European data strategy with the aim to turn the EU into a leading role model for a society empowered by data to make better decisions – in business as well as in and the public sector (The European Commission, 2020). In fact, Europe aims to capture the benefits of a better use of data, including greater productivity and competitive markets, but also improvements in health and well-being, environment, transparent governance and convenient public services. The measures laid out in the recent communication "A European Strategy for Data" (The European Commission, 2020) contribute to a comprehensive approach to the data economy that aim to increase the use of, and demand for, data and data-enabled products and services throughout the Single Market.
In the period 2021-2027, the Commission will invest in a High Impact Project on European data spaces and federated cloud infrastructures. The project will fund infrastructures, data-sharing tools, architectures and governance mechanisms for thriving data-sharing and Artificial Intelligence ecosystems. It will be based on the European federation (i.e. interconnection) of energy-efficient and trustworthy edge and cloud infrastructures (Infrastructure-as-a-Service, Platform-as-a-Service and Software-as-a-Service services).

In spite of the economic potential, data sharing between companies has not taken off at sufficient scale (The European Commission, 2020). Concretely, the Commission intends to fund the establishment of EU-wide common, interoperable data spaces in strategic sectors. Such spaces aim at overcoming legal and technical barriers to data sharing across organisations, by combining the necessary tools and infrastructures and addressing issues of trust, for example by way of common rules developed for the space. The spaces will include: (i) the deployment of data-sharing tools and platforms; (ii) the creation of data governance frameworks; (iii) improving the availability, quality and interoperability of data – both in domain-specific settings and across sectors. Funding will also support authorities in the Member States in making high value data sets available for reuse in the different common data spaces. The support for data spaces will also cover data processing and computing capacities that comply with essential requirements in terms of environmental performance, security, data protection, interoperability and scalability.

[7] The workshop cited is "Advanced & Interoperable Digital B2B Platforms for Smart Factories and Energy", which was held in Brussels (15-16 October 2018).

Besides regulation, this supports the idea that the fostering of B2B industrial digital platforms needs both financial support and more awareness raising. Some recent studies pointed out that the concept of B2B data sharing and the opportunity in creating B2B digital platforms remains rather unknown. The advantages of how different forms of data sharing can enhance business-to-business relations are not yet fully understood by businesses, as it is not always clear how they can use the potential of Application Programming Interfaces (APIs), which can safely manage the flow of information between disparate systems. Other non-technical reasons can be put forward when analysing why B2B digital platforms are not fully exploited yet. The reluctance that some businesses still display vis-à-vis the deployment of cloud-based platforms is certainly among these reasons. The regulatory aspects related to data sharing, with specific reference to absence of appropriate guidelines and frameworks for intellectual property rights (IPRs), unclear customer protection regulations and insufficient clarity around data ownership, data access and data control, also contribute to a general lack of trust towards B2B digital platforms. These difficulties are grafted onto pre-existing barriers, which affect primarily small and medium enterprises, hence the backbone of Europe's businesses. Indeed, SMEs in Europe and elsewhere find it difficult to muster the necessary digital skills for managing data exchanges at platform level and, more generally, they tend to show a certain reluctance in moving from a company-centric approach to an ecosystem-driven and shared way of working. All these barriers are further discussed in the last section of this document (see section "Analysis of barriers" at page 27).

Creating awareness could lead companies to adopt more open data policies in order to freely share data and foster the development of new products and services. Nevertheless, small and medium-sized enterprises (SMEs) in particular need both a better understanding of the opportunities granted by data sharing, as well as the access to financial support to create the necessary conditions to engage in B2B. Policymakers can stimulate this process through targeted awareness-raising campaigns or specific funding schemes that support economies of scale across sectors and help the B2B platform market grow. To this end, the European Commission has already dedicated EUR 200 million for 2019 and 2020 through the Horizon 2020 programme for platform building in the areas of energy and manufacturing.

Mapping Industrial Digital Platforms

Analysis of supply

Main Players

When it comes to the analysis of the B2B industrial digital platform supply market, it is important to assess not only the capability of each player, but also their market penetration and their ability to evolve. This paper assesses these parameters by looking at the market penetration of what can be defined as the "entry gate" for the B2B industrial digital platform, which is typically the basic IoT data integration and analysis component as outlined in the paragraph above. This is confirmed by the analysis of the existing value proposition of some of the most important B2B industrial digital platform players worldwide. Indeed, these players started their journey from the IoT space by creating IoT platforms – and are still very focused on that. IoT is therefore central to the B2B industrial digital platform for several reasons:

- IoT is the most recent disruptor on the IT markets, one that creates massive amounts of data and significantly impacts business processes. Incorporating real-time data from IoT with information generated using traditional enterprise technologies (ERP, supply chain management, manufacturing operations management, asset management, etc.) is a big challenge for many companies – one that ultimately needs new architectures and technologies to create actionable insights from the data generated.
- Companies across sectors have soon realised that, in order to make the best use of the opportunity created by IoT and to monetise IoT data, they needed to collaborate with peers in the same industry or even in different industries. For example, data generated by an automotive producer can be used to create new usage-based insurance policies, or an industrial company can share information collected from its operating equipment with the equipment suppliers to help them benchmark their products against competitors.
- Demand has risen for solutions that enable collaboration and data sharing between companies and across ecosystems and the creation of new and compelling industry-specific use cases.

Therefore, in order to analyse the market potential and the ecosystem impact of the main technology platforms currently available, we have put together an overview of the key players and their current potential to drive ecosystem transformation. The following list provides some of the main suppliers at worldwide level in this space, and a description follows in Table 1 below.

Table 1: Main Players

0-6%
7-12%
13-18%
19-24%
25-30%*

Name	Description	Worldwide	European Union	United States	Asia and Pacific
AT&T Control Center and DataFlow	A managed cloud hosted IoT service that extends the intelligent network, enabling enterprise companies to create new business value through the management, integration and consumption of connected device data				
AWS IoT	Provides a set of industrial IoT, data lake, analytics, and machine learning tools to help customers develop smart factories and products, provide insights to increase operational efficiency, and accelerate pace of innovation				
Bosch IoT Suite	Offers a comprehensive toolbox for IoT developers, offered as Platform-as-a-Service (PaaS). It provides key middleware capabilities needed to build sophisticated IoT applications from top to bottom				
Cisco Jasper	A cloud-based software platform for IoT to enable product businesses to become IoT service companies. Enables enterprises to launch, manage and monetize an IoT deployment in a single turnkey solution				
Ericsson Device Connection Platform	A cloud service enabling operators to offer connectivity management to their enterprise customers. Supports operators in building up IoT solutions from device connection to the deployment of enterprise services				
Fujitsu Cloud IoT Platform	Eliminates the complexity of traditional IoT deployments and makes business intelligence data easily accessible to all businesses. The PaaS based solution is customizable, scalable and integrates sensor data into mainstream production				
GE Predix	Equips industrial organizations with everything they need to rapidly build securely deploy, and effectively run IIoT applications from edge to cloud, using latest digital technology from digital twins to industrial AI				
Google Cloud IoT	Delivers a set of tools to connect, process, store and analyse data both at the edge and in the cloud. The platform consists of scalable, fully-managed cloud services and an integrated software stack for edge/on-premises computing				
Hitachi Vantara	Provides intelligence to visualize the factory floor, optimize maintenance and repair with real-time data, analytics and artificial intelligence				
HPE Universal Platform	A scalable, modular software platform to accelerate, simplify and connect IoT. Provides federation of device and service management, data acquisition, and exposure to applications				
IBM Watson IoT	Accelerates the asset performance management journey, reduces downtime, increases product quality and creates safer workspaces				
Microsoft Azure IoT	Enables modernization of industrial systems thereby increasing operational efficiency while creating new revenue streams that keep pace with customer needs. Use case examples: condition monitoring and connected products				
Oracle IoT Cloud Service	Simplifies IoT to rapidly assimilate IoT into a company's digital strategy and create innovative services with less risk. The solution provides real-time analysis tools that allow to correlate, aggregate, and filter incoming data streams				
PTC ThingWorx	Designed for developing industrial IoT solutions, with the ability to scale from the cloud to the edge. Offers market end-to-end IIoT capabilities, from connecting assets to delivering data insights and orchestrating smart assets				
SAP Cloud Platform IoT	Connects devices to the platform to provide scalable ingestion of IoT data and device management. The respective services provide a secure connection to remote devices using IoT protocols and managing the device lifecycle				
Siemens MindSphere	The cloud-based IoT open operating system connects products, plants, systems and machines, allowing to harness data with advanced analytics. It also gives access to a growing number of apps and a development PaaS				
Software AG/Cumulocity IoT Platform	Offers IoT connectivity for networked digital devices and sensors through a cloud-hosted IoT device management and application platforms				
Verizon ThingSpace	The IoT platform is designed to help businesses and OEMs create, test, connect and bring IoT ideas to market. Offers a single point of entry for development, connectivity, testing and automation tools for IoT				
Vodafone	The platform has an intuitive interface with a comprehensive development toolset enabling IoT applications to be built. The inbuilt catalogue of APIs makes integration with third party applications like analytics platforms easy				

*30% of market penetration as IoT platform

Source: IDC, 2018

Table 1 presents an overview of the main B2B industrial digital platforms and their estimated relevance at worldwide level and in three different regions – the EU, the United States and the Asia-Pacific region. The relevance is measured in terms of market adoption of these platforms, i.e. an estimate of how much companies in these regions are currently investing or planning to invest during the next 12 months in the platforms under consideration. A colour scale from red to green, with green representing the highest observed adoption of 30% is used to depict the table.

The table contains a variety of companies with a very heterogeneous mix of core competences – from industrial (e.g. Bosch and GE) to telco infrastructure (e.g. Cisco and Fujitsu), telecom (e.g. AT&T and Verizon), and cloud hyperscalers (e.g. AWS or HPE). This shows how crowded this space is becoming, with actors from different backgrounds gathering to reap some market value.

In Europe, the companies in the most advanced positions at present are Google and Microsoft. This is a natural consequence of their scale and existing market penetration levels in other areas of the IT space, as well as their close relationship with most IT departments. IBM is another key contender – one that has probably reached lower penetration not because of a lack of brand strength and capability, but rather because of the more enterprise-centric nature of its business models, which cater to a more restricted audience with respect to Microsoft and Google.

A closer look at the table reveals the following insights:

- Companies dominant in the IT market over the past decade or so, such as Microsoft and Google, are better placed to dominate the B2B industrial digital platform space than companies with more recently established value propositions based on industrial solutions, such as Hitachi and Bosch.
- U.S.-based companies provide most of the key platforms. Examples from elsewhere include Software AG, Hitachi, Fujitsu, Bosch, and Ericson, which generally enjoy industry-specific niches and thus only have limited market share. This is generally true of players based in Europe and Asia. U.S.-based providers are thus becoming more dominant, reflecting the above point.
- The European market is currently somewhat compartmentalised and is thus at risk of monopolisation. Key players such as Google and Microsoft have little continent-wide competition and are well positioned to take substantial market share.
- SAP and Siemens, despite being European-based companies, have higher penetration rates in the U.S. than in Europe, a reflection of the U.S. market being more receptive to such technology solutions.

The Platform is the New Business Battleground

Today, the role of the digital economy is uncontested: an increasing and unprecedented amount of data is relentlessly gathered, organised, and exchanged so that value (organisational, economic, and otherwise) can be extracted. The concept of the digital economy, however, would make little sense without the idea of the digital platform, where information power, cognitive capacity, and ubiquitous access converge to shape new organisational tools, capabilities, and frameworks, with unprecedented effects on businesses, the economy, and society as a whole.

Leading organisations across all industry sectors are therefore shifting to "platform thinking", with direct impacts on their business models and their technology architecture. Indeed, platform thinking allows for a fundamental change in business and organisational strategies. This entails moving beyond the traditional business practices that were geared around product differentiation and pricing policy and focusing instead on ecosystem-based value creation. In the same fashion, platform thinking represents a long-term, sustainable response to the new reality of the digital economy, in which organisations and companies from all industry sectors can rapidly transform themselves into digital-native enterprises.

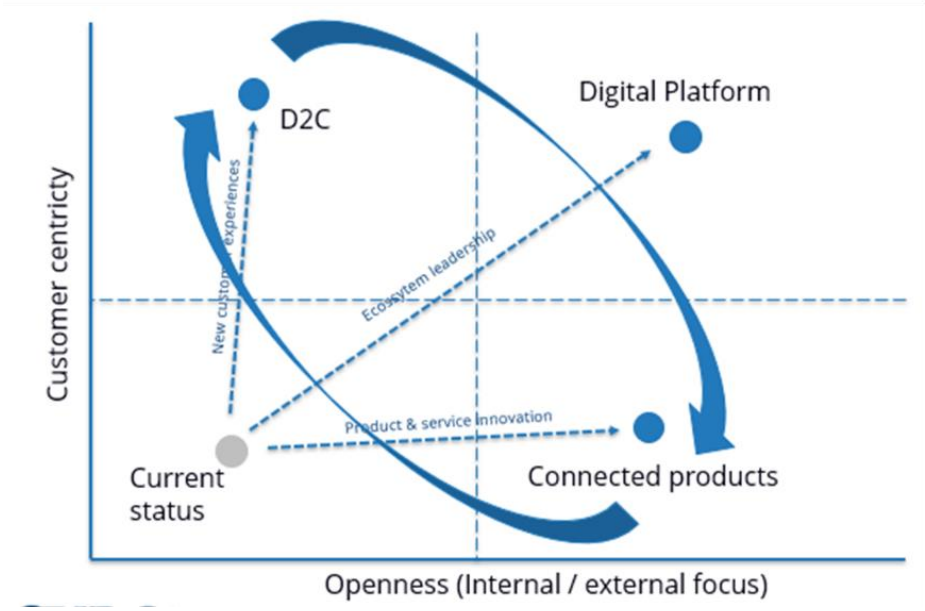
This is crucial because, today, survival of the fittest is linked not to size but to the ability to change — to move quickly, adapt, seize opportunities, and be agile. Capturing a piece of the digital transformation opportunity is at the centre of business strategies today. Across all industries, this amounts to an increased annual economic value of €17 trillion, or nearly 25% of global GDP. This is the value of new services and products generated through platforms (IDC, 2018). The manufacturing sector stands to gain most of all, accounting for $4.5 trillion (approximately €3.6) of this opportunity. However, in this renewed business context, capturing profits will be highly dependent on controlling or participating in the right platform. Therefore, an essential skill for every organisation to thrive in this new business context is to be able to understand the changing market context while being able to leverage platforms to sustain, advance, and scale business and operations.

Figure 1 highlights the nature of this transformation. While some companies are developing strategies that focus on getting closer to the consumer (D2C) or are enhancing their value proposition by releasing connected products, the big disruption will come from those players that are able to create more value for their customers by leveraging the data provided by connected products and processes in open ecosystems. As these ecosystems encompass an ever-growing number of companies and are increasingly becoming a strategic element of business success, a relatively small number of organisations will eventually be able to lead those ecosystems by leveraging their first-move advantage, size, and innovation strategies. Other companies – the majority – will eventually take a follower position that is of a compliant member. As the best-performing companies pull away from the rest, this will create a bifurcated and unequal landscape where a few firms achieve high productivity and profits.

To sum up, digitalisation acts as a multiplier that creates faster, more dynamic, and competitive marketplaces, thus creating a widening gap between the few thriving companies — the best performers, that leverage their capabilities to create new digital products and services, expand digital ecosystems, and foster digitally savvy workforces — and the majority. As such, IDC predicts that in 2023, 20% of discrete manufacturing ecosystem participants worldwide will lead and shape ecosystems through technology innovation and vision, resulting in polarised gains within value chains (Source: IDC FutureScape: Worldwide Manufacturing Business Ecosystems 2019 Predictions).
This has three main impacts:

- The success of an organisation will be dependent not only on the decisions that it makes with regard to its own IT environment, but also on which platform it will decide to play the ecosystem battle.
- As a consequence, the capability to integrate external data within the business strategy and to conversely influence the market will be critical.
- "Data brokers" will therefore become an essential component of the ecosystem. These can be defined as IT environments, which are externally managed or shared by ecosystem participants that are in charge of some or all of the operational data management functions of the ecosystem (such as Data collection and archival, transmission, aggregation, and synchronisation), as well as securely handling data ownership / stewardship, provisioning and billing. In some forms many of these functions already exist in the form of IT platforms, but as the data monetisation business models become more pervasive, other technologies such as interconnection platform or ad-hoc mechanism can potentially take more ground.

Figure 1: The role of platforms to sustain businesses and operations



Source: IDC, 2018

The Importance of the Data Economy

A major finding of a recent IDC study on the data market and the data economy[8] is the idea that a market in which data-related products and services can be exchanged needs to be based on a trusted network in which data are transferred, accessed, and used in a secure mode. B2B industrial digital platforms possess these characteristics as they represent virtual environments that facilitate the exchange and connection of data between different organisations through a shared reference architecture and common governance rules. By linking different actors who are interested in sharing information in the form of data, industrial data platforms constitute a composite business ecosystem combining players from disparate backgrounds and thus foster the creation of new data-driven services and innovative business processes. In establishing a trusted network for data access, transfer, and usage, B2B data platforms are opening new business ecosystems and rapidly disrupting traditional value and supply chains in bringing together a wide array of disparate players from a multitude of sectors. As such, they represent a key enabler of digital transformation and are an essential element of ongoing industrial digitisation.

Beyond the general definition of virtual environments facilitating the exchange and connection of data, industrial digital platforms follow two distinct models:

- The first model is represented by multi-company-led open environments conceived to meet the requirements of a wide community of industry users from different sectors. A key example of this model is the International Data Space (IDS) initiative. Led by the Fraunhofer Institute, the IDS represents one of the first examples in Europe of an information technology architecture for safeguarding data sovereignty within the corporate ecosystem. The architecture constitutes a virtual data space allowing all companies adhering to a set of common rules to exchange, link and enrich data securely and confidently. Among the organisations currently taking part to IDS we find names such as

[8] G. Cattaneo, G. Micheletti and L. Veronesi (IDC) 28TH July 2016. "European Data Market SMART 2013/0063. D3.10 Industrial Data Platforms – *Key Enablers of Industry Digitization*." See also European Data Market SMART 2016/0063 (IDC).

Allianz, Audi, Boehringer Ingelheim, Rittal, Salzgitter and Volkswagen, among many others;

- The second model rests upon single-company initiatives whereby an individual organisation (usually, a prominent ICT player or a leading industry actor) establishes its own data platform and opens it up to other companies for commercial purposes – primarily, within the boundaries of a specific industry sector. This case counts for the vast majority of implementations and is defined by the use cases provided by vendors listed in Table 1.

In both cases, industry data platforms not only enable data to be accessed, exchanged, and used in a secure and trusted environment, but they also provide benefits that surpass mere technical and architectural aspects. Using "connectors" and "application layers", they also provide participant companies with the possibility to develop customised applications and, as a result, an ever-growing number of company-tailored digital services. This in turn generates economies of scale and networking effects that will be critical for the success of the digitisation of the industry, whether at the national, European, or world level.

Typically, industrial data platforms perform several services above and beyond the data exchange between data providers and data users. In particular, they:

- Establish clear data governance rules and safeguard the principle of data sovereignty by granting the data owners (which usually, but not always, coincide with data providers) the exclusive right to determine the terms and conditions of the use of the data provided.
- Deliver "brokerage" services between data providers offering data and data users requesting data – within a common environment. Whether embodied by a single organisation or shared across more than one data platform's participants, the "broker" presides over different functions offered by data platforms, such as keeping records of data transactions, performing search tasks, and facilitating ad-hoc agreements between data providers and data users should these parties not be able to come to a common understanding about the provision and use of certain data.
- Provide access to an application layer (through a series of shared application programming interfaces, or APIs) in which the data platform's participants may obtain and develop software to produce data-driven products and services.

Industrial Data Platforms: Open Model vs. Proprietary Model

Still in its infancy, industrial data platforms are constantly evolving and may take different forms and shapes based on, among other things, the degree of openness that they grant, the business/operational model they adopt, the types of service they offer, and the governance model they embrace. Our empirical research has unveiled two main data platform types:

- Multi-company-led user-driven open industrial data platforms, which are characterised by a bottom-up approach and are designed to meet the requirements of a wide range of end users belonging to a specific industry sector or to several industry sectors: Truly open in their nature, these platforms are based on a decentralised governance approach, as well as on distributed technical architecture, and are currently primarily oriented towards pre-competitive activities with the aim of identifying and defining the actual requirements of the user companies participating in the platform. In this type of platform, no single company or platform participant plays a dominant role, and no central authority is in charge of data management or is granted special supervisory functions. This is not to say that open platforms do not have rules regarding data use and data exchange; such rules exist

but are commonly established by all participants and developed around the specific user requirements of all participants.

- Single-company-led supply-driven proprietary industrial platforms, which are developed and steered by an individual organisation – usually, an ICT vendor or a prominent industry player – for commercial purposes: Still open to the participation of companies and organisations from multiple sectors, these platforms are "owned" by a single company and follow a commercial rationale, with participants playing subscription fees based on the amount of data that they exchange and the services they access. Proprietary platforms tend to specialise and offer services around the knowledge base of their owners – typically, in manufacturing (automotive and other transport equipment, machinery and related equipment, computers, electronic components, etc.). Unlike multi-company-led open data platforms, this type of platform has a centralised data governance approach and a centralised architecture (although open to some degree of customisation by the platform's participants through shared APIs).

The distinctive features of the open and proprietary data platform models are summarised in the table below:

Table 2: Industrial Data Platform Types and Their Distinctive Features

	Open Industrial Data Platforms	Proprietary Industrial Data Platform
Leadership	Multi-company	Single-company
General Approach	Bottom-Up; User-Driven	Top-Down; Supply-Driven
Main purpose	Pre-competitive research; definition of user requirements	Commercial
Sector Specialization	Horizontal (in principle)	Vertical (in principle)
Data Governance	Decentralised	Centralised
Technical Architecture	Distributed	Centralised with varying degree of openness

Source: IDC,2018

Multi-company-led open data platforms and single-company-led proprietary data platforms represent the two ends of a theoretical continuum, whereas the reality is clearly characterised by a much higher degree of complexity. The actual landscape of industrial data platforms presents a more variegated picture, with features pertaining to each of the two extremes often distributed along the full length of the continuum.

Technology Detail

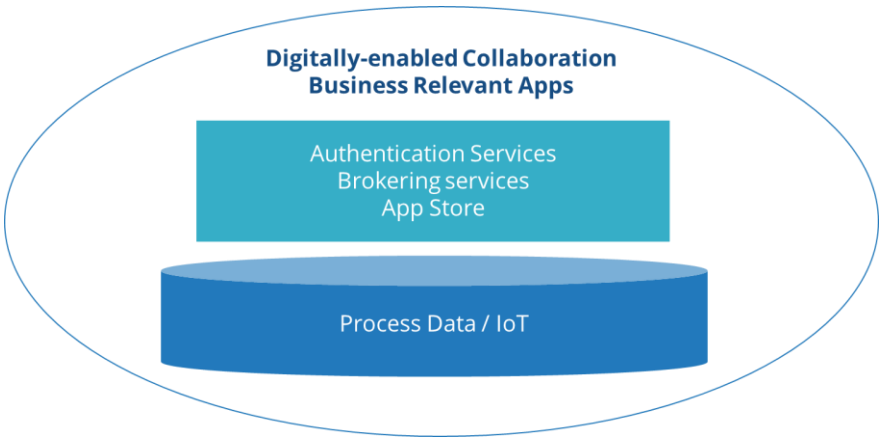
Recent market trends show that technology players are increasingly taking more interest in serving the unique needs of manufacturing ecosystems, and such companies joining these ecosystems reflects an emerging business model. In fact, to meet increased expectations from manufacturers for end-to-end solutions, technology suppliers are actively collaborating with other players in the industry to offer integrated technology solutions.

To this end, most technology vendors are focusing on embedding features in products/solutions that facilitate seamless collaborations within different functions inside business organisations and across their ecosystem partners. In order to do so, they are creating open and flexible architectures that can "talk" to the overall technology landscape while mitigating the dichotomy between "openness" and "security".

This is done through an architecture that can be summarised in the following way (see Figure 2 below)

- Data-capture process and data analysis: This is a layer for application deployment and systems infrastructure from multiple parties; it enables the connection of devices and the collection and management of vast amounts of data from operational processes (e.g. production and field services). This is typically the gateway to the B2B industrial digital platforms upon which the other two layers are built.
- Data management and access services: These constitute an industry-specific and cloud-based pre-integrated set of capabilities and resources and are mostly delivered via an as-a-service cloud computing model (platform as a service, or PaaS). These services enable manufacturers to conduct business transactions with other users, transfer files inside and outside of the organisations, and publish and process events through authentication services, data brokering, and dedicated applications.
- Collaboration and application platform: This collaboration enables deployment and development, a platform through which multiple manufacturers and non-manufacturing companies can collaborate to achieve common goals. This layer is designed for custom-built industry applications, whereby companies can develop an ecosystem of providers that thrive by sharing the knowledge and competencies of companies from different industries. This layer leverages a common technological environment to standardise and synchronise processes and activities.

Figure 2: A new, flexible, architecture



Source: IDC, 2018

As a result, the role of technology today exceeds that of a simple enabler; it is a key contributor to and differentiator of the core value proposition and, ultimately, determines the success of an ecosystem. Indeed, many technologies contribute to the success of ecosystem-based value propositions. Each layer type constitutes a technological and collaborative setup that addresses specific business issues. In each case, the success of business ecosystems depends on collaboration within and across enterprises; hence, the seamless exchange of information and inter-enterprise collaboration lead to transparency in decision making and trust among participants.

Analysis of demand

Overview

B2B industrial data platforms are rapidly gaining momentum in Europe and across the rest of the industrialised world. The table below summarizes the estimated market value of the European B2B industry digital cloud market from 2018 to 2023, using a combination of the IDC Industry Cloud Tracker[9] and the IDC IoT Spending Guide[10]. The Industry Cloud Tracker, which combines actual information as gathered from leading IT vendors and IDC-owned models, constitutes the basis of the analysis as it provides a very reliable data basis for a reasonable estimate of the actual size of B2B Industrial data platforms' market. Both tools have been used in this paper to estimate the market growth as a year-on-year evolution. Based on the correlation and between the proliferation of IoT platforms and the related need for data governance and sharing, IDC relied on the IoT Spending Guide forecasts for software IoT Platforms as the main constituent of the growth model.

Table 3: Market size and forecast European B2Bindustry digital cloud market

	Industries	2018	2019	2020	2021	2022	2023	CAGR 2018 - 2023
Total value/market size (USD million)	Construction, Transportation, Utilities	684.44	865.38	1,053.30	1,219.10	1,366.06	1,484.74	16.8%
	Government, Health and Education	184.96	233.08	303.73	385.61	459.75	519.47	22.9%
	Manufacturing and Resources	964.34	1,177.73	1,400.44	1,600.96	1,798.69	1,993.39	15.6%
	Media and Telcos	42.81	54.56	68.23	80.05	89.31	96.66	17.7%
	Professional, Consumer, and Financial Services	143.82	189.58	246.85	306.06	362.22	401.70	22.8%
	Retail and Wholesale	209.75	273.74	359.36	452.44	553.07	627.55	24.5%
	TOTAL	**2,230.13**	**2,794.06**	**3,431.91**	**4,044.22**	**4,629.09**	**5,123.52**	**18.1%**
Growth rate	Construction, Transportation, Utilities		26.4%	21.7%	15.7%	12.1%	8.7%	
	Government, Health and Education		26.0%	30.3%	27.0%	19.2%	13.0%	
	Manufacturing and Resources		22.1%	18.9%	14.3%	12.4%	10.8%	
	Media and Telcos		27.5%	25.0%	17.3%	11.6%	8.2%	
	Professional, Consumer, and Financial Services		31.8%	30.2%	24.0%	18.3%	10.9%	
	Retail and Wholesale		30.5%	31.3%	25.9%	22.2%	13.5%	
	TOTAL		**25.3%**	**22.8%**	**17.8%**	**14.5%**	**10.7%**	

Source: IDC analysis based on IDC Industry Cloud Tracker and IDC IoT Spending Guide

IDC estimates that B2B industrial data platforms have already reached a significant market value (estimated at almost $2.8 billion in 2019, approximately €2.5 billion) – one that is poised to grow at a compound annual growth rate (CAGR) of around 18% through to 2023. As our analysis shows, manufacturing is and will be the biggest consumer of this technology, followed by Construction, Transportation and Utilities. We also see 2020 as the year when adoption will peak across all industries.

Furthermore, according to the Advanced Technologies for Industry survey, carried out between July and September 2019, awareness in Europe is high. Survey data shows that most companies in Europe have at least heard of B2B industry digital platforms; nearly 60% on average are at least evaluating some related business cases. However, this result varies from country to country. Generally, awareness is a slightly lower in Central & Eastern Europe (CEE) than in Western Europe (WE).

The adoption level in Europe also differs across company-size segments; it generally rises proportionally with company size. While most of the market is in the ideation phase, with use cases

[9] IDC Cloud Trackers describe how cloud technologies and services continue to form the foundation for digital transformation and innovation. These trackers analyse how business has migrated from on-premise deployment to public or private cloud; how much IT budget has been spent on enabling the delivery of cloud services; and how swiftly or substantially the cloud markets are growing, either from a vendor, market, or geographical perspective. Retrieved from https://www.idc.com/promo/trackers/cloud

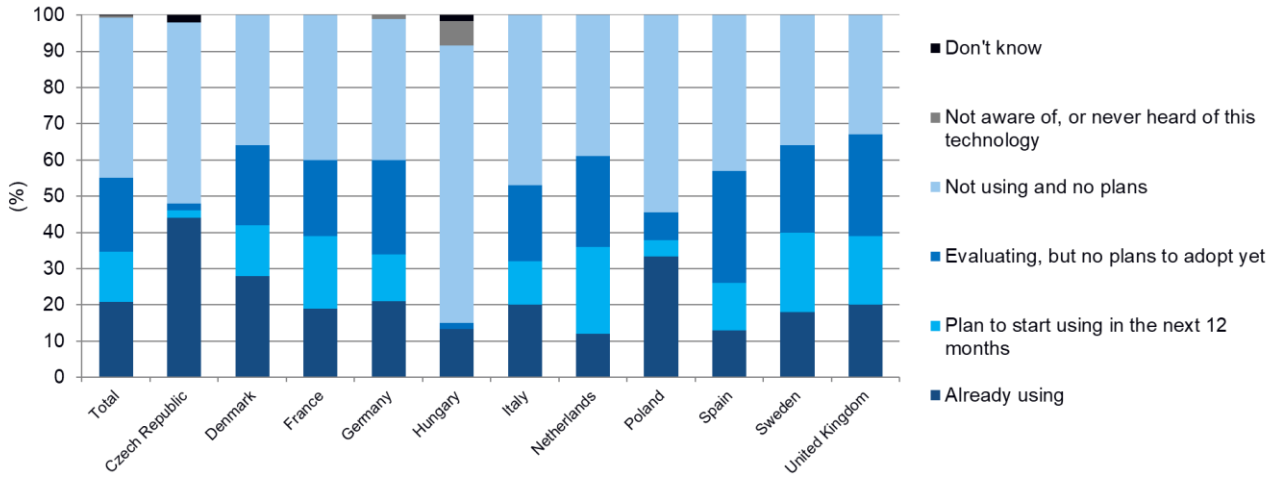
[10] IDC, with The Worldwide ICT Spending Guide: Industry and Company Size, examines the ICT market opportunity from a technology, industry, company size, and geography perspective. This comprehensive database delivered via IDC's Customer Insights query tool allows the user to easily extract meaningful information about ICT markets by viewing data trends and relationships and making data comparisons. Retrieved from https://www.idc.com/getdoc.jsp?containerId=IDC_P33207

still being identified, those companies currently running or developing pilots are mostly large entities. Companies that are not pursuing the opportunities presented are at risk of being left behind and losing market share to the front runners.

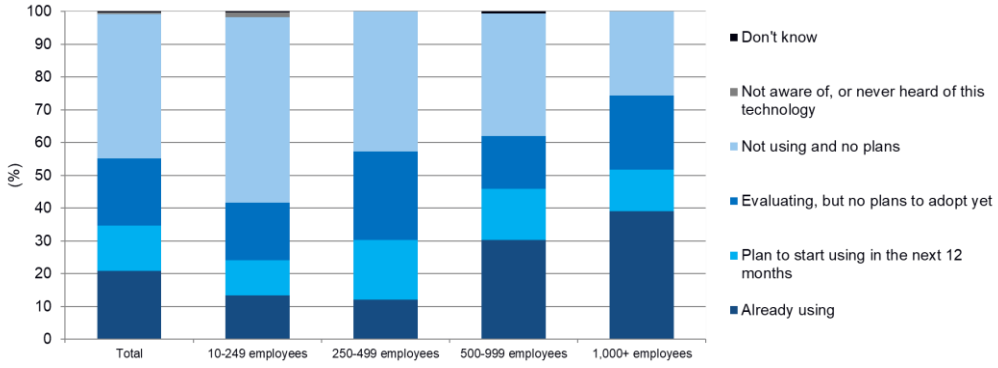
Indeed, when it comes to "make or buy" decisions for B2B industrial data platforms, several options can be identified. In the vast majority of cases, a company would simply access the B2B industrial data platforms to participate in the ecosystem, by paying a fee to the platform provider. However, few leading companies are actually deciding to be the application providers, in order not just to benefit for the ecosystem interaction, but also to rely on the additional revenue generated from accessing license and to capitalize on the market opportunities that being the "platform leader" entails. While few companies have the in-house capability to fully develop an B2B industrial data platform from scratch, their relevance remains quite significant to the whole ecosystem and market.

Figure 3: "Is your organisation using or planning to use B2B industrial digital platforms?"

a) By Geography



b) By Company Size



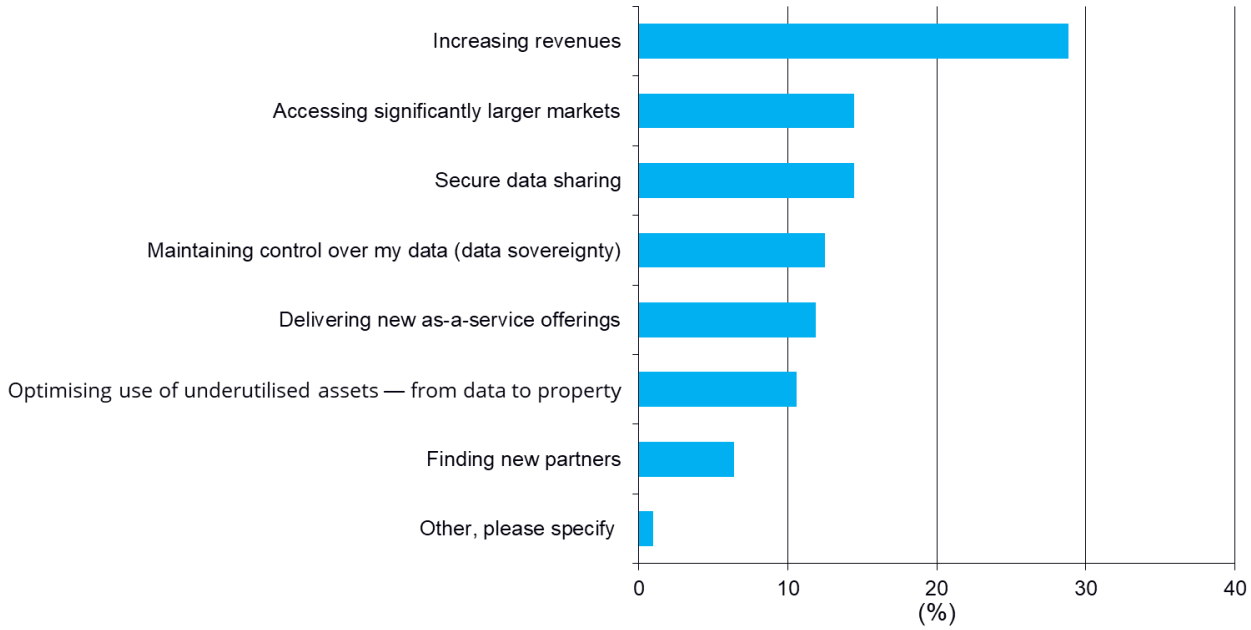
Source: Advanced Technologies for Industry Survey, July 2019

According to the Advanced Technologies for Industry Survey, there are multiple benefits in the adoption of B2B platforms, such as the potential to access significantly larger markets and thus increase revenue. The perceived growth potential associated with these technologies reveals companies' faith in such solutions. However, as yet, few companies are focusing on strategic targets, such as delivering new as-a-service offerings, optimising the use of assets (e.g. by sharing them in the ecosystem via a networked operational model), and finding new partners. The vision concerning potential opportunities is still nascent; it is limited to the most immediate benefits that can be attained rather than encompassing broader strategic transformation.

Analysing results at the country level, we see a significant difference in trends between Western Europe and the rest of Europe. While companies in Western Europe focus on increasing revenue, CEE companies pay more attention to the security of data sharing and maintaining control over data. CEE companies are also more interested in looking for partnerships. Western European companies generally have more faith in these technologies and are striving to leverage ecosystem collaboration opportunities to increase revenues and drive innovation. By comparison, CEE companies are more interested in data operations, viewing these technologies mostly from the perspective of support for new partnerships around digital initiatives, but without compromising on data governance.

Benefits analysis by company size shows a relatively even distribution of benefits, with the exception of benefits around market expansion, which heavily correlate with company size.

Figure 4: What are the main benefits of participating in a B2B industrial digital platform?



Source: ATI Advanced Technologies for Industry Survey, July 2019

Figure 5: What are the main benefits of participating in a B2B industrial digital platform?

Central Eastern Europe and Western Europe trends

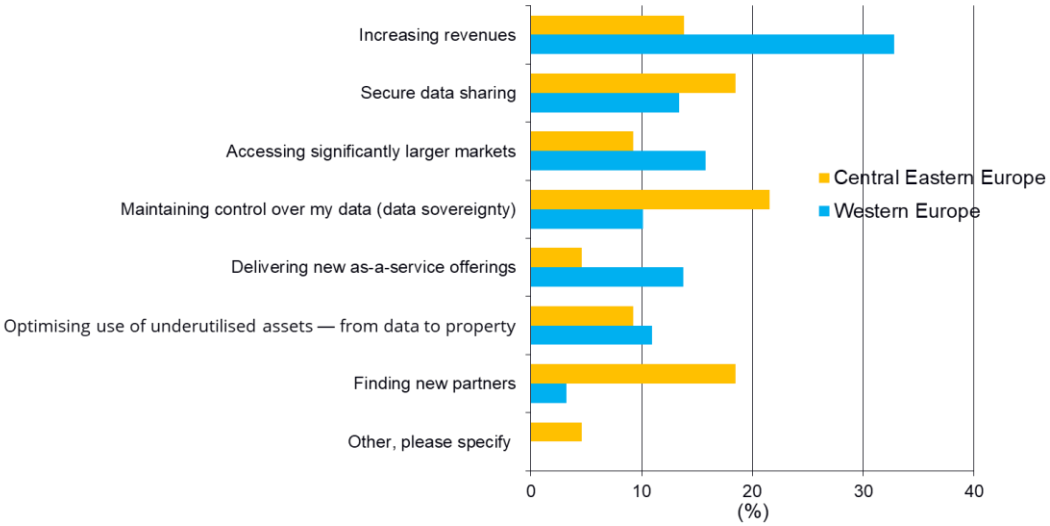
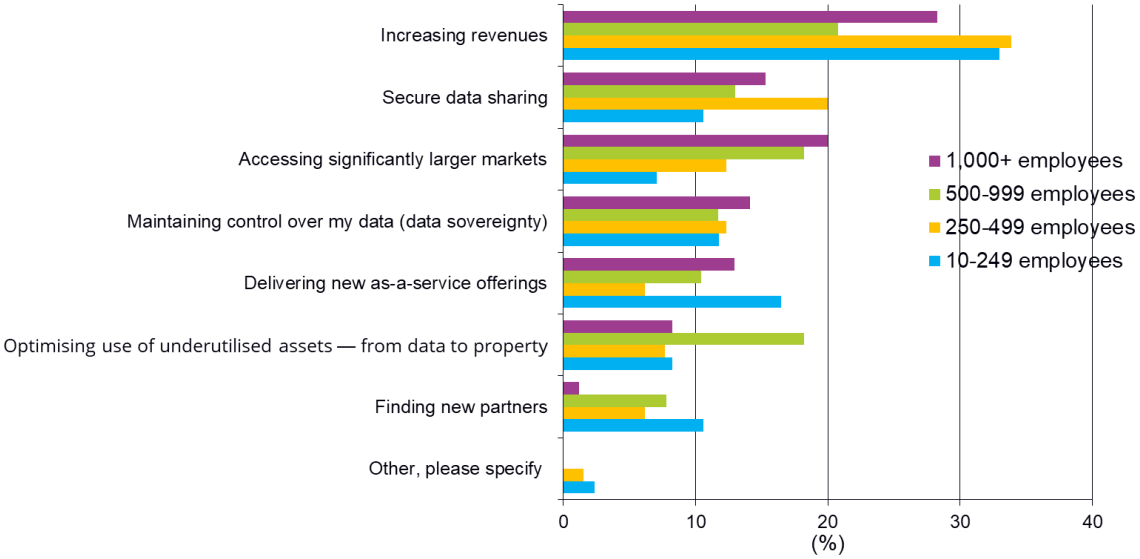


Figure 6: What are the main benefits of participating in a B2B industrial digital platform?

Industry size



Source: Advanced Technologies for Industry Survey, July 2019

B2B Industrial Digital Platform Benefits at the Industry Level

Use-case-based analysis can shed more light to the contribution of B2B industrial digital platforms to the overall process of digital transformation. Our use-case taxonomy for digital transformation covers multiple industry sectors. The taxonomy follows a hierarchical structure, beginning with the digital mission of each industry, the strategic priorities that support that mission, the programs that will be initiated to satisfy the priorities, and the funded projects or use cases that will be implemented under those programs.

Use cases are discretely funded efforts supporting a program objective. Use cases can be thought of as specific projects employing line-of-business and IT resources, including hardware, software, and IT services. Each use case is organised by the use-case name, current situation, business goals and objectives, key technologies used to enable desired business outcomes, and a summary of the results.

The table below presents the main use cases in manufacturing industries, with a detailed description of the current situation, the expected outcomes, the role that a B2B industry platform could play, and the required surrounding technologies.

Each use case is also assigned to one or more of the following domains, which are industry-specific value-chain-like concepts used to classify the manufacturing industry:

- Engineering-Oriented Value Chains (EOVC) (automotive, aerospace and defence, ship and rail building, farming, construction, and industrial machinery)
- Asset-Oriented Value Chains AOVC (chemicals, metals, pulp and paper, and other base materials)
- Brand-Oriented Value Chains BOVC (food and beverage, footwear, apparel, household care, and health and beauty)
- Technology-Oriented Value Chains TOVC (semiconductors, electronic components, electronic devices, and computing and telecommunications)

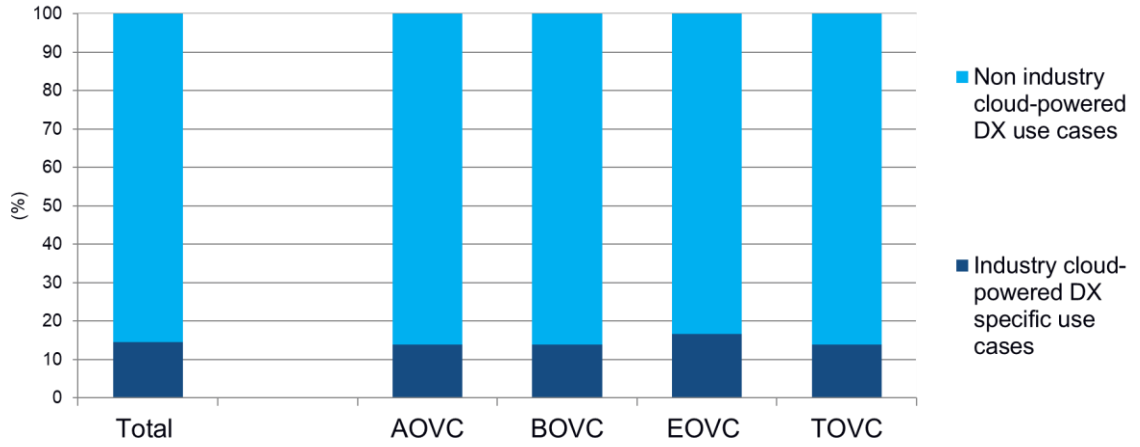
Table 4: Use cases summary table

Use Case	Main industries Covered	Use Case Summary	Current Situation	Goals and Objectives	Role B2B Industry Platform	Surrounding Technologies (Besides B2B Industry Platform)
Sourcing intelligence	EOVC, AOVC, TOVC	Understanding supplier capacities at a deeper level such as machine capabilities, certifications, capacity, and company demand for those items; continuous rebalancing of the supply of critical items based on capabilities rather than units and quantity	Current best practice looks at aggregate buying volumes with vendors for negotiation.	Buying based on capacity reservation at suppliers based on a digital twin of the entire supply chain will yield lower inventories and higher perfect order results.	Provides visibility into who ordered what, when and from which supplier. Includes real time monitoring and reporting for trend analysis	Hardware: Servers and storage Software: Cloud, cognitive, and blockchain Services: Business consulting and IT services
Supplier network management	EOVC, TOVC	Instrumenting supplier production and warehousing facilities to create a fully informed digital twin	Supply position is based on very little data, and best practice is based on batch processing such as EDI.	Near-real-time awareness of supply position will yield lower transportation costs and better on-time delivery of finished goods.	Reduces complexity and cost of warehousing, e.g. the platform connects organizations in need of additional warehouse capacity to organizations that have this spare capacity	Hardware: IoT and business network Software: Cloud and cognitive Services: Business consulting and IT services
Demand and consumption signal processing	EOVC, BOVC, TOVC	Instrumenting demand signals from customers and channel partners creates an accurate representation of real-time demand in the supply chain digital twin.	While common in consumer value chains, automated feeds of actual demand are rare in this value chain.	Near-real-time adjustment of demand takt times will support higher revenue, especially in aftermarket parts and services.	Key capability is supporting the gathering of data across ecosystem that support demand sensing which helps reduce inventory costs and identify additional sales opportunities	Hardware: Mobile and IoT Software: Industry cloud Services: Business consulting and IT services
Transportation optimization	EOVC, BOVC, TOVC	Real-time contextual model that balances long-term cost optimization with near-term service levels	Load tendering is automated and spend optimization tools are used, but no real-time contextual management is used.	Reduce freight costs including expedited freight. Improve on-time delivery of inbound material and outbound finished goods.	Platform acts as hub, allowing manufacturers, suppliers, distributors and transportation providers to tap into one central source, pull data from ERP systems, and receive order-tracking alerts and notification of potential problems	Hardware: IoT, robotics, and business network Software: Cognitive and+D5 digital twin Services: Business consulting and IT services
Global trade automation	EOVC, BOVC, TOVC	Instrumentation of physical containers integrated with distributed ledger-based settlement for both import and export of goods	Some automation exists for automating regulatory compliance and financial processing but is not tightly integrated.	The objectives are reduction in declaration penalties, improved time through customs, accurate/timely settlement, lower freight forwarding costs, and less dispute resolution.	Improves collaboration about critical information (such as tax rules, compliance requirements, etc.) and quickly routes it through the organization's trading ecosystem	Hardware: Mobile, IoT, and business network Software: Blockchain, and digital twin Services: Business consulting and IT services
Vendor engagement	EOVC, AOVC	There will be a digital platform that enables vendors to assess their performance against expectations, collaborate in supply chain planning and execution processes, and engage in efforts to add additional value.	Vendor relationships are managed rather than engaging. Vendors are treated as sources of supply and their performance is reviewed internally and when vendors do not meet expectations alternative options are evaluated.	The objective is to treat vendors as collaborative partners in the value chain by equipping them with the tools and insight to proactively improve their performance and add additional value to the relationship.	Enables companies to communicate with suppliers in real-time and along every step of the procure-to-pay process	Hardware: IoT Software: Cloud, BDA, and social Services: Business consulting and IT services

Source: IDC, 2018

By analysing the distribution of these uses case across use-case taxonomies, we estimate that, in total, B2B digital industry platforms can contribute to 14.6% of the digital transformation efforts that European Manufacturers have to put in place in 2019 (see Figure 7).

Figure 7: Use case distribution by industry domains



Source: IDC, 2018

This calls for analysis of the impact of these technologies on the industry as a whole and for an assessment of the potential disruption these technologies can have on a given industry.

The result of the analysis is the balanced scorecard presented in the table 5 below, in which we assign a weight to use-case relevance in terms of industry competitiveness, the level of disruption provided by the B2B platform, and the level of preparedness/awareness of European companies, which together indicate the abilities of the industry to adapt to the technological transformation provided by these solutions through the different use cases. The darker the shade of blue associated with a use case against any of the factors measured (e.g. business relevance), the stronger its impact on that particular area.

The analysis highlights that the two most mission-critical use cases to address are:

1) those concerning the ability to manage supplier networks efficiently (because of the importance of this use case for the manufacturing industry) and
2) the ability to aggregate supply and demand data into a single collaborative platform (vendor engagement) – mostly, because of the high level of unpreparedness across most European companies as well as the complexity associated with managing such large supplier networks (which can span across multiple tier as is for example the case in the automotive industry). Well established examples of such supplier management platforms include SAP Ariba, Infor Nexus and IBM Sterling Commerce.

Table 5: Use cases relevance in terms of industry competitiveness

Use case	Business relevance of the process (manufacturing)	Relevance of disruption provided by B2B industry platforms	Level of preparedness/ awareness of European companies	Disruption potential	Opportunity	Risk
Sourcing intelligence						
Supplier network management						
Demand and consumption signal processing						
Transportation optimization						
Global trade automation						
Vendor engagement						

Source IDC, 2018

Analysis of barriers

This section thoroughly assesses the main challenges and barriers hindering the creation and evolution of sector specific industrial B2B platforms and their further development in Europe. While the benefits of sharing data at B2B industry level are clear, multiple barriers are still preventing the development of commercially viable and proprietary data sharing business models. There could be also an uncertainty regarding potential gains due to a lack of established data valorisation models (traditional models such as database rights and standard licensing are insufficient); fear of breaches of IPR and confidentiality violations by malicious third parties or even partners; uncertainty about the legal framework on ownership and access conditions; legal barriers to the free flow of data across borders leading to subsequent blocks to full exploitation and innovation; and contractual issues with cloud service providers about data portability and liability in case of damages. These uncertainties are stronger for SMEs, particularly in large supply chains (e.g. farmers struggling to control data about their own fields generated by machines controlled by large corporations).

A wide variety of barriers exists regarding data sharing through B2B industrial data platforms, such as:

Cloud platform barriers: These barriers relate to the (perceived or actual) lack of security, scalability, and privacy and, intrinsically, to the nature of cloud environments. Until recently, cloud was often considered "taboo" for too many companies, especially for mission-critical and information-intensive processes, such as for example those related to the production assets in a factory. But we are currently witnessing a significant transformation. Companies realise the short-term opportunity of using cloud as the fabric to establish a companywide platform for analysing data from the shop floor and converting it into actionable information for decision makers. The most recent survey research from IDC (CloudPath Survey) reveals that much ground still needs to be covered. Figure 8 shows the main concerns about the adoption of public and private cloud among European manufacturers. In this chart, security, IT governance, regulatory, and downtime issues are perceived as higher risk when it comes to the public cloud. However, given the advances in technology and support over the last three years from the main public cloud platform enablers (hyperscalers such as Amazon Web Services - AWS, Microsoft, IBM, and Google), private infrastructures, which are often managed in house by limited internal resources, may result being less and less secure than commercially available public clouds.

Figure 8: Concerns about Cloud Adoption

Source: WW Industry CloudPath 2019, IDC, April 2019, Base= European Respondents. N=111

Insufficient level-playing field for data: The absence of a set of regulations and standards for data sharing (and the digital single market having yet to fully materialise) over time has led to weak policy implementation around the free flow of data across ecosystems. These barriers also relate to regulatory aspects, such as the lack of appropriate frameworks for intellectual property rights (IPR) and consumer protection regulation, lack of clarity around data ownership, access to and control of data, and, more importantly, a lack of mutual trust between the parties involved. As a result, currently, data exchange between different companies is often regulated by bilateral contractual agreements between the parties. These agreements do not come in standard formats and offer different levels of data transferability and data access depending on the sensitivity of the data forming part of the exchange. For instance, data obtained by a machinery OEM (Original Equipment Manufacturer) through process manufacturing equipment can reveal fundamental features of the OEM customers' final products. In this case, OEM's customers engage in complex negotiations with the OEM to limit the amount of data exchanged and maintain data intellectual property rights (IPRs). Another option available to the different parties is that application providers act as data custodians, providing a secure and trustable environment. In other words, they do not acquire ownership of the data that they process; they do not have unlimited access to it; and, most importantly, they cannot perform any data mining activities that would reveal commercially exploitable information about the organisations using the cloud platform, which often compete in the same market. These types of contract have proven to work in a limited environment, but the capability of an ecosystem to scale by leveraging a B2B industrial platform will depend on the regulatory framework that evolves in terms of whether it allows for a standardised approach to data sharing.

Cultural barriers: These barriers pertain to stakeholders' reluctance to innovate and their lack of confidence and entrepreneurship in changing the way they work, which must move from a company-driven approach to an ecosystem-driven concept. These barriers ultimately relate to a shortage of digital skills and a gap between the supply and demand of proficient data workers and professionals, i.e. both people who have the hard skillsets of programming and of handling, managing, mining, and analysing data, as well as people who can work with data and have the right soft skills to operate and thrive in data-driven processes that rely on real-time mutable information. While these barriers are typically very relevant in a high-code environment (for example internal software programming or Database management), they are no less relevant when it comes to cloud computing, which is the foundational technology of B2B Industrial Digital platforms. IDC's 2019 Industry CloudPath Survey[11], which investigates cloud adoption and the cloud buyer's journey across 13 countries, revealed that most of the challenges occurring in cloud

[11] https://www.idc.com/getdoc.jsp?containerId=US45378619

implementations do not pertain to the strategic level (e.g. board support). On the contrary, they are more essential in nature as they deal with the alignment between transformation direction, company culture, and the ability of individual workers to adapt (see Figure 9). This last point ultimately can affect the execution of any cloud project, no matter what the scope.

Figure 9: Challenges Companies Face in Adopting Cloud

Source: IDC, 2018

Data monetisation challenges: Recent research (see for example EVM Survey, 2018 IDC[12]) reveals that, when it comes to leveraging IoT/industrial data inside the organisation, the vast majority of European manufacturers (90%) are as yet unable to monetise the data and use it to transform their business processes. In most cases, IoT data is simply collected and stored and/or used for process analytics. IDC's Global DX Leaders Survey (May 2018)[13] shows that, today, companies are pursuing revenue through several digital models, such as platform sharing, risk/reward sharing, economic sharing, and/or data monetisation sharing. Most interestingly, the same research revealed that the situation is unlikely to change much in the near future, as no clear model prevails.

Ability of business to cope: The previous barrier reflects persistent hurdles for companies trying to adapt their business processes and strategies to enable innovation. This often pushes companies beyond their operational comfort zones. B2B ecosystems may thus end up disrupting business processes to the point where companies are unable to cope. Taking the example of ecosystems for spare parts – highly relevant for industries such as aerospace, defence, machinery, automotive, and high tech – the perceived value of aftermarket services lies not in the value of the spare part per se, but in the ability of the company to deliver the right spare part to the right place and at the right time in the context of complex ecosystem transactions. The variable and unpredictable nature of this type of service can present a significant challenge. Companies must be agile enough to respond to unpredictable low-volume and intermittent demand and to fulfil same-day service requirements to support warranty commitments, maintain a customer's uptime, and avoid penalty payments. In order to capitalise on the aftermarket services opportunity, manufacturers need to put in place new organisational structures, processes, and tools that support services-based business models.

[12] https://nordic.idc.com/promos/RESOURCES/ATTACHMENTS/Nordic-Digital-Insights-Report.pdf
[13] More information retrievable at: https://www.idc.com/getdoc.jsp?containerId=EMEA44323818

Conclusions

Digital platforms, and in particular B2B industrial digital platforms, are becoming an irreplaceable component of the data economy. Indeed, the whole concept of the data economy would make little sense without being able to exchange data across different organisations through a shared reference architecture and according to common governance rules. What is more, the sheer possibility of linking different actors across disparate domains and various backgrounds produces positive effects not only to the companies and organisations directly involved in the data exchange but also to the wider environment around them. Digital platforms in fact contribute to the creation of a composite business ecosystem that is conducive of innovative products, solutions and business processes.

In the light of the above, it is not surprising that leading organisations across all industry sectors are now shifting to "platform thinking" with direct impacts on their business models and technology architecture, but also with significant impacts on their business and organisational strategies. Indeed, these innovative ecosystems now encompass an ever-growing number of companies and are increasingly becoming a strategic element of business success. According to a series of recent studies (IDC, 2018)[14], the value of new services and products generated through digital platforms at worldwide level across all industries could amount to a buoyant €17 trillion in 2019, nearly 25% of the global GDP. Not everyone will benefit from that, though, as only a relatively small number of organisations will able to lead those ecosystems by leveraging their first-move advantage, size and innovation strategies. The remainder will eventually take a follower, less advantageous position. When looking in more detail on who is currently securing the majority of this significant prize, it becomes evident that European companies lag behind their U.S. counterparts as they tend not to enjoy the scale and the market penetration levels of their American rivals. Europe is still a rather fragmented market with several players that enjoy and dominate industry-specific niches but can only master limited market shares (representative examples of European niche-dominant B2B platforms companies are Software AG, Bosch and Ericsson). Other European key players, such as Siemens and SAP, exhibits higher penetration rates in the U.S. than back in Europe, a reflection of the U.S. market being more reactive to technology innovation and innovative ecosystems than the European one.

If the supply-side picture of the B2B industrial digital platforms appears to be rather mixed, the demand for digital platforms shows no signs of slowing down: B2B industrial digital platforms have already reached a market value of €2.5 billion in 2019 and are projected to exceed the threshold of €4.6 billion by 2023 – marking a considerable compound annual growth rate (CAGR) of more than 18% over the next five years. Why is it so? Companies in Europe do perceive clear advantages in the adoption of B2B platforms, such as the potential to access significantly larger markets and increase revenues as a result. However, this vision concerning potential opportunities with the adoption of B2B platforms is still nascent in Europe and appears to focus more and tactical and immediate benefits rather than on broader strategic targets, such as delivering new as-a-service offerings, optimising the use of assets and finding new partners in the ecosystem. This is reflected by the main B2B digital platform-related use-cases that are being deployed by European companies today. Among a relative high number of use cases currently associated and enabled by digital platforms only two of them appear to be mission-critical for European organisations: 1) those concerning the ability to manage supplier networks efficiently and 2) those related to the ability to aggregate supply and demand into a single collaborative platform. The complexity associated with managing such large supplier networks (which can span across multiple tier as is for example the case in the automotive

[14] The latest research and results mentioned in this report where also presented at the IDC Manufacturing Forum 2019 (11th – 12th November, Prague) "Improving Competitiveness in Manufacturing: Digital, Automation, Effectiveness, Ecosystems".

industry) and the difficulties that many European businesses are experiencing in bringing together supply and demand around a single platform are a testimony of the level of unpreparedness across a large tier of European organizations and the need to further develop the concept of B2B platforms in Europe.

Unpreparedness cannot be attributed to a sheer lack of skills, resources and investment, nonetheless. Several barriers and a variety of threats are currently hindering data sharing among European businesses. First of all, the uncertainty regarding potential gains due to a lack of established data valorisation models; secondly, the fear of breaches of IPR and confidentiality violations by malicious third parties or even partners; then the uncertainty about the legal frameworks on data ownership and data access conditions followed by contractual issues with cloud service providers about data portability and liability in case of damages. These uncertainties will have to be addressed quickly and effectively if the innovation potential of B2B digital platforms is to be ensured in Europe over the next few years.

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ANNEX I – B2B Platforms - Survey Questions

In this report two relevant sets of questions regarding B2B industrial digital platforms were selected from the ATI Advanced Technologies for Industry Survey, in order to be further analysed with graphical statistics and insights from desk research.

The Advanced Technologies for Industry Survey

The survey of 900 organisations with more than 10 employees across Europe was carried out between July and September 2019. The countries covered are the Czech Republic, Denmark, France, Germany, Hungary, Italy, the Netherlands, Poland, Spain, Sweden and United Kingdom.
The ATI Survey sample consisted of 900 interviews of European companies with more than 10 employees. Eligible respondents were individuals best qualified to answer questions about overall ICT, digital and technology strategy and activities.
The Contractor selected the company (or organisation) as the sampling unit. For the purposes of this survey a "company" refers to a legal or social entity, or a group of entities, that engage(s) in activities and transactions (such as the purchase of IT goods and services) in its/their own right. A company must have sole ownership or control. It can be heterogeneous regarding its economic activity and location. It has legal, administrative, or fiduciary arrangements; organisational structures; or other parties with the capacity to efficiently allocate resources to achieve objectives. Examples include corporations, non-profit institutions, and government agencies. When the enterprise is a single location organisation, the concepts of "company" and "local unit/establishment" coincide.
The survey investigates adoption of advanced technologies (both key enabling technologies (KETs) and digital technologies), industry-specific use cases, digital transformation drivers, approaches and maturity, collaboration, KPIs and business impacts, as well as enabling conditions for innovations (e.g. investment in IT, funding sources, skills).

Table 6 : B2B – related set of questions

SELECTED QUESTIONS FOR DELIVERABLE D2.6

1. *Which of the following technologies is your organisation using or planning to use?*
    - *qb B2B industrial digital platforms*
2. *What is the main benefit of participating in a B2B industrial digital platform?*

1. Which of the following technologies is your **organisation** using or planning to use?

B2B industrial digital platforms

Legend: note that when analysing data at country level, sample for some specific verticals may not be statistically representative. Therefore, data for those verticals might be significant only at total level. Red colour stands for a small sample size, yellow for medium sample size, green adequate sample size.

qb. Which of the following technologies is your organisation using or planning to use?

			TOTAL	Country										
				Czech Republic	Denmark	France	Germany	Hungary	Italy	Netherlands	Poland	Spain	Sweden	United Kingdom
qb. B2B industrial digital platforms	Not aware of, or never heard of this technology	Column N %	0.56%	0.00%	0.00%	0.00%	1.00%	6.67%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Already using	Column N %	20.89%	44.00%	28.00%	19.00%	21.00%	13.33%	20.00%	12.00%	33.33%	13.00%	18.00%	20.00%
	Plan to start using in the next 12 months	Column N %	13.78%	2.00%	14.00%	20.00%	13.00%	0.00%	12.00%	24.00%	4.44%	13.00%	22.00%	19.00%
	Evaluating, but no plans to adopt yet	Column N %	20.44%	2.00%	22.00%	21.00%	26.00%	1.67%	21.00%	25.00%	7.78%	31.00%	24.00%	28.00%
	Not using and no plans	Column N %	44.11%	50.00%	36.00%	40.00%	39.00%	76.67%	47.00%	39.00%	54.44%	43.00%	36.00%	33.00%
	Don't know	Column N %	0.22%	2.00%	0.00%	0.00%	0.00%	1.67%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Total	Unweighted N=	900	50	50	100	100	60	100	100	90	100	50	100

qb. Which of the following technologies is your organisation using or planning to use?

			TOTAL	Company Size			
				10-249 employees	250-499 employees	500-999 employees	1,000+ employees
qb. B2B industrial digital platforms	Not aware of, or never heard of this technology	Column N %	353	215	168	164
	Already using	Column N %	1.42%	0.00%	0.00%	0.00%
	Plan to start using in the next 12 months	Column N %	13.31%	12.09%	30.36%	39.02%
	Evaluating, but no plans to adopt yet	Column N %	10.76%	18.14%	15.48%	12.80%
	Not using and no plans	Column N %	17.56%	26.98%	16.07%	22.56%
	Don't know	Column N %	56.66%	42.79%	37.50%	25.61%
	Total	Unweighted N=	0.28%	0.00%	0.60%	0.00%
			353	215	168	164

qb. Which of the following technologies is your organisation using or planning to use?

			TOTAL	Industry Sector										
				Finance	Gov/Edu	Healthcare	Manufacturing - discrete	Manufacturing - process	Professional Services	Retail, Wholesale	Telecom, Media	Transport/Logistics	Utilities, Oil, Gas	Agriculture
qb. B2B industrial digital platforms	Not aware of, or never heard of this technology	Column N %	90	73	85	71	78	100	95	67	98	70	73
	Already using	Column N %	0.00%	1.37%	0.00%	0.00%	1.28%	0.00%	0.00%	0.00%	1.02%	0.00%	2.74%
	Plan to start using in the next 12 months	Column N %	34.44%	5.48%	11.76%	19.72%	6.41%	39.00%	28.42%	37.31%	15.31%	20.00%	5.48%
	Evaluating, but no plans to adopt yet	Column N %	23.33%	6.85%	10.59%	7.04%	10.26%	17.00%	18.95%	23.88%	11.22%	10.00%	9.59%
	Not using and no plans	Column N %	16.67%	26.03%	17.65%	30.99%	23.08%	17.00%	20.00%	11.94%	21.43%	24.29%	17.81%
	Don't know	Column N %	25.56%	60.27%	60.00%	42.25%	58.97%	27.00%	32.63%	26.87%	51.02%	45.71%	61.64%
	Total	Unweighted N=	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.74%
			90	73	85	71	78	100	95	67	98	70	73

2. What is the main benefit of participating in a B2B industrial digital platform?

Legend: note that when analysing data at country level, sample for some specific verticals may not be statistically representative. Therefore, data for those verticals might be significant only at total level. Red colour stands for a small sample size, yellow for medium sample size, green adequate sample size.

qe4. What is the main benefit of participating in a B2B industrial digital platform?

				Country										
			TOTAL	Czech Republic	Denmark	France	Germany	Hungary	Italy	Netherlands	Poland	Spain	Sweden	United Kingdom
qe4. What is the main benefit of participating in a B2B industrial digital platform?	Delivering new as-a-service offerings	Column N %	11.86%	8.70%	9.52%	2.56%	29.41%	0.00%	0.00%	19.44%	2.94%	11.54%	15.00%	20.51%
	Secure data sharing	Column N %	14.42%	34.78%	28.57%	15.38%	2.94%	12.50%	6.25%	19.44%	8.82%	7.69%	20.00%	12.82%
	Maintaining control over my data (data sovereignty)	Column N %	12.50%	30.43%	9.52%	15.38%	11.76%	12.50%	12.50%	11.11%	17.65%	3.85%	10.00%	5.13%
	Accessing significantly larger markets	Column N %	14.42%	4.35%	9.52%	20.51%	8.82%	12.50%	18.75%	13.89%	11.76%	19.23%	15.00%	17.95%
	Optimising use of underutilised assets — from data to property	Column N %	10.58%	0.00%	4.76%	12.82%	23.53%	25.00%	6.25%	8.33%	11.76%	3.85%	10.00%	12.82%
	Increasing revenues	Column N %	28.85%	8.70%	33.33%	33.33%	20.59%	12.50%	50.00%	25.00%	17.65%	46.15%	30.00%	28.21%
	Finding new partners	Column N %	6.41%	8.70%	4.76%	0.00%	2.94%	12.50%	6.25%	2.78%	26.47%	7.69%	0.00%	2.56%
	Other, please specify	Column N %	0.96%	4.35%	0.00%	0.00%	0.00%	12.50%	0.00%	0.00%	2.94%	0.00%	0.00%	0.00%
	Total	Unweighted N=	312	23	21	39	34	8	32	36	34	26	20	39

qe4. What is the main benefit of participating in a B2B industrial digital platform?

			Company Size			
			10-249 employees	250-499 employees	500-999 employees	1,000+ employees
qe4. What is the main benefit of participating in a B2B industrial digital platform?	Delivering new as-a-service offerings	Column N %	16.47%	6.15%	10.39%	12.94%
	Secure data sharing	Column N %	10.59%	20.00%	12.99%	15.29%
	Maintaining control over my data (data sovereignty)	Column N %	11.76%	12.31%	11.69%	14.12%
	Accessing significantly larger markets	Column N %	7.06%	12.31%	18.18%	20.00%
	Optimising use of underutilised assets — from data to property	Column N %	8.24%	7.69%	18.18%	8.24%
	Increasing revenues	Column N %	32.94%	33.85%	20.78%	28.24%
	Finding new partners	Column N %	10.59%	6.15%	7.79%	1.18%
	Other, please specify	Column N %	2.35%	1.54%	0.00%	0.00%
	Total	Unweighted N=	85	65	77	85

qe4. What is the main benefit of participating in a B2B industrial digital platform?			Industry Sector										
			Finance	Gov/Edu	Healthcare	Manufacturing - discrete	Manufacturing - process	Professional Services	Retail, Wholesale	Telecom, Media	Transport/Logistics	Utilities, Oil, Gas	Agriculture
qe4. What is the main benefit of participating in a B2B industrial digital platform?	Delivering new as-a-service offerings	Column N %	7.69%	0.00%	21.05%	5.26%	7.69%	21.43%	11.11%	17.07%	11.54%	0.00%	0.00%
	Secure data sharing	Column N %	17.31%	33.33%	21.05%	36.84%	23.08%	12.50%	8.89%	12.20%	3.85%	9.52%	0.00%
	Maintaining control over my data (data sovereignty)	Column N %	15.38%	22.22%	15.79%	5.26%	7.69%	12.50%	6.67%	17.07%	3.85%	23.81%	9.09%
	Accessing significantly larger markets	Column N %	25.00%	0.00%	0.00%	10.53%	15.38%	12.50%	13.33%	17.07%	15.38%	9.52%	18.18%
	Optimising use of underutilised assets — from data to property	Column N %	9.62%	22.22%	36.84%	10.53%	15.38%	7.14%	4.44%	2.44%	11.54%	23.81%	0.00%
	Increasing revenues	Column N %	23.08%	22.22%	5.26%	26.32%	30.77%	25.00%	42.22%	24.39%	38.46%	28.57%	63.64%
	Finding new partners	Column N %	0.00%	0.00%	0.00%	5.26%	0.00%	7.14%	13.33%	7.32%	15.38%	4.76%	9.09%
	Other, please specify	Column N %	1.92%	0.00%	0.00%	0.00%	0.00%	1.79%	0.00%	2.44%	0.00%	0.00%	0.00%
	Total	Unweighted N=	52	9	19	19	13	56	45	41	26	21	11

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