Study on data sharing between companies in Europe

everis

an **NTT DATA** Company

Digital Single Market

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List of abbreviations

AAL	Ambient Assisted Living
AIOTI	Alliance for Internet of Things Innovation
API	Application Programming Interface
B2B	Business-to-business
C-ITS	Cooperative Intelligent Transport Systems
CRISP-DM	Cross Industry Standard Process for Data Mining
CRM	Customer Relationship Management
DG	Directorate-General (of the European Commission)
DSO	Distribution System Operator
DSM	Digital Single Market
EC	European Commission
EDF	Electricité de France Group
EEA	European Economic Area
EIP-AGRI	European Innovation Partnership for Agricultural Productivity and Sustainability
ERP	Enterprise Resource Planning
EU	European Union
FMIS	Farm Management Information Systems
FTP	File Transfer Protocol
GLM	Generalised Linear Model
GDP	Gross Domestic Product
GDPR	General Data Protection Regulation
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
IaaS	Infrastructure as a Service
ICT	Information and Communications Technology
IoT	Internet of Things

IT	Information Technology
MNO	Mobile Network Operator
OECD	Organisation for Economic Co-operation and Development
OEM	Original Equipment Manufacturer
RMI	Repair and Maintenance Information
SAREF	Smart Appliances REFerence ontology
SDK	Software Development Kit
SME	Small and medium-sized enterprise
TSO	Transmission System Operator
VoIP	Voice over IP

Glossary

Unless otherwise mentioned, the definitions provided below were developed by the project team for the specific purposes of this study.

Application Programming Interface (API) – A software component that facilitates the interaction with other software components[1] and enables them to share data.

Cookie – Small text file that a website saves on a user's computer or mobile device when he/she visits the site. This file enables the website to identify users and to remember them and their custom preferences when they visit the website again.[2]

Crowdsourcing – Collaborative way of working/collaborative work involving multiple contributions channelled via internet platforms.

Data – Facts or information used for analytical or decision-making purposes. Within the scope of this study, data may either or both constitute a business asset for the company that owns them and/or for a third company using them. This study focuses on the share and re-use of machine-generated data, either generated by sensor-equipped, connected devices, by internal IT business systems or through external users' interaction with websites, as well as data generated from crowdsourcing or web collaboration. This study does not distinguish between personal or non-personal data.

Data broker – Company that aggregates data from a variety of sources, cleanses and/or analyses them to license these data to interested companies.

Data marketplace – An online store or platform where companies can regularly buy and sell data[3]. The data marketplace connects data suppliers and data users and thereby acts as an intermediary in the transaction of the data.

Data re-use – The process by which a company re-uses data from another company, which is not a direct market competitor, for its own business purposes (excluding contractor-subcontractor relationships). These data were either accessed for free or acquired against some remuneration or other kind of compensation, including the provision of a service.

Data sharing – The process by which a company makes data available to another company that is neither a direct market competitor nor a sub-contractor and is interested in these data for its own business purposes. The company that shares data may either do so willingly or as a result of a legal obligation, and the transaction can either be made for free or entail some remuneration or compensation, including the provision of a service.

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[1] European Commission, DG Employment, Social Affairs and Inclusion, "ESCO: API", available at: https://ec.europa.eu/esco/portal/api
[2] European Commission (2016), "Information providers guide: The EU Internet Handbook", available at: http://ec.europa.eu/ipg/basics/legal/cookies/index_en.htm
[3] IDC and Open Evidence (2017), *European Data Market Study*, SMART 2013-0063, p. 140, available at: http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=44400

Data supplier – Company that holds data (either self-generated, collected or acquired from others with sub-licensing rights) and makes them available to other companies which are neither direct market competitors nor sub-contractors. This company represents the supply side of the data market.

Data transaction – Any kind of exchange in a business context in which data are the key trading element.

Data user – Company that re-uses data from other companies, which are neither its direct market competitors nor contractors, by analysing or exploiting the data as a way to improve or develop its own business. This company represents the demand side of the data market.

Event – In the field of data management and analytics, an event can refer to the interaction of a user with content or with a page, or to the interaction of a sensor with its environment that can be tracked independently[4]. Examples of events are downloads, clicks, credit card payments, logs, etc.

Improved product/service – Any quality innovation to a product or a service, such as the inclusion of new components, the addition of new functions or a change in their design, which yields economic benefits for the company.

Industrial Data Platform – Virtual environment enabling the exchange of data among different companies through a shared reference architecture, common governance rules and within a secure business ecosystem.[5] They can either take the form of open, multi-company-led environments and encompass different business sectors, or be led by a simple company and limited to a specific business sector.[6]

Internet of Things (IoT) – Innovative technology enabling the interconnection of objects and people through communication networks that allow them to report about their status and/or the surrounding environment and to react autonomously to events and changes in an appropriate manner[7].

Machine-generated data – Raw data created without direct human intervention by computer processes, applications or services, or by sensors processing information retrieved from equipment, software of machinery, whether virtual or real, and with application in a variety of domains. It can be personal or non-personal in nature.[8]

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[4] Google Analytics: https://support.google.com/analytics/answer/1033068?hl=en and API Guides – Sensors Overview by Android: https://developer.android.com/guide/topics/sensors/sensors_overview.html

[5] Tardieu, H. (2017), "Security Challenges in Industrial Data Platforms" (presentation at the European Stakeholder Forum), available at:
https://ec.europa.eu/futurium/en/system/files/ged/a3_tardieu_atos_ecworkshop_essen-2.pdf

[6] IDC and Open Evidence (2017), *European Data Market Study*, p. 141.

[7] IDC and TXT (2014), *Definition of a Research and Innovation Policy Leveraging Cloud Computing and IoT Combination*, p.18, available at: https://ec.europa.eu/digital-single-market/en/news/definition-research-and-innovation-policy-leveraging-cloud-computing-and-iot-combination, and European Commission (2013), "The Internet of Things" (last updated on 9/5/2017), available at: https://ec.europa.eu/digital-single-market/en/internet-of-things

[8] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: "Building a European Data Economy", 10.01.2017, COM(2017) 9 final, available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2017:9:FIN.

Microdata – Sets of records that contain information about individual persons, households or businesses.[9]

Tracking – Remotely entering end-user's terminal equipment to monitor their activities online, collect information about them and/or identify the location of their devices.[10]

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[9] Eurostat (s.d), "What are microdata?", available at: http://ec.europa.eu/eurostat/web/microdata
[10] European Commission (2017), *Proposal for a Regulation concerning the respect for private life and the protection of personal data in electronic communications and repealing Directive 2002/58/EC (Regulation on Privacy and Electronic Communications)*, 2017/0003 (COD), 10.01.2017, available at:
https://ec.europa.eu/digital-single-market/en/news/proposal-regulation-privacy-and-electronic-communications

Abstract

B2B data sharing and re-use can be generally understood as *making data available to* or *accessing data from* other companies for business purposes. As detailed in this report, data sharing in a business-to-business context can take different forms: from unilateral to more collaborative approaches, data can be shared against a payment, through the provision of a service, or for free.

Based on evidence gathered in this study, companies share and re-use data among them to enhance their business opportunities and improve internal efficiency. B2B data sharing and re-use are expected to significantly grow in a near future. Companies not yet engaged recognise the benefits of these activities and express their intention to start sharing and re-using data in the next five years. This study also found that companies that do not invest a critical amount of money in accessing real-time or positioning data may be missing business opportunities.

To foster the European data economy, the Commission should further develop and raise awareness about the concept of B2B data sharing and its benefits, privilege soft policy measures over restrictive regulations, and provide guidance and financial support to companies that are interested in sharing and re-using data among them.

Executive summary

Deepening the understanding about B2B data sharing and re-use in the European Economic Area

Following its Communication on 'Building a European Data Economy' in early 2017, the European Commission launched a study to deepen its understanding about data sharing and re-use in business-to-business relations in the European Economic Area (EEA). This study ran from July 2017 to February 2018 and was particularly aimed at:

- Estimating the quantitative dimension of data sharing and re-use between companies inside the EEA

- Identifying missed business opportunities resulting from the lack of access to relevant data from other companies

- Determining the obstacles to data sharing and re-use between companies

- Ascertaining success factors for data sharing between companies

This study targeted companies with different sizes[11] operating in six particular sectors[12] in 31 countries[13]. It specifically considered machine-generated data, which entail data produced without the direct intervention of a human by sensors or by computer processes, applications and services. The study did not distinguish between personal and non-personal data following the assumption that companies comply with relevant data protection legislation.

Further evidence in relation to the interest and current engagement in B2B data sharing has been gathered, along with relevant insights about the European data economy ecosystem. This study generally corroborated findings from previous research and consultation exercises.

The concept of B2B data sharing is not commonly known and fully understood

Although this study confirmed that companies are already sharing and re-using data among them, it also revealed that the concept of *B2B data sharing* remains rather unknown and is not completely understood. Moreover, different terminology is being used to refer to the exchange of data between companies for business purposes (such as *data transfer and access* or *data sharing and re-use*) which may have led to misinterpretations of the concept.

This study provides three key messages to clarify what 'B2B data sharing' means:

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[11] Considering Eurostat's classification of 'enterprise size', this study targeted companies with four different sizes: large (250 or more employees), medium (50 to 249 employees), small (10 to 49 employees) and micro (less than 10 employees).

[12] The study particularly focused on six business sectors: data-generating driving (i.e. automotive, transport and logistics), smart agriculture, smart manufacturing, telecom operators, smart living environments (i.e. home automation, sensors, robotics, or wearable technology), and smart grids & meters.

[13] The targeted countries comprised the 28 EU Member States, Iceland, Liechtenstein and Norway.

- Companies that engage in B2B data sharing do not necessarily grant access to their complete datasets. The proportion of data shared by companies usually depends of their business strategy.

- The term 'sharing' should not be understood as 'for free'. There are different business models governing 'B2B data sharing' (which may entail a payment for giving access to data) and others may still be created as the data economy evolves.

- Companies ultimately decide with whom they wish to share their data with. Although there may be legislation in force that regulates access to certain data, companies have autonomy and control over the data they want to share and in relation to the usage conditions they want to set.

B2B data sharing can take different forms

Distinct business models for engaging in B2B data sharing have been identified:

- *Data monetisation:* unilateral approach under which companies make additional revenues from the data they share with other companies. Data can also be monetised through the provision of services.

- *Data marketplaces:* trusted intermediaries that bring data suppliers and data users together to exchange data in a secure online platform. These businesses make revenue from the data transactions occurring in the platform.

- *Industrial data platforms:* collaborative and strategic approach to exchange data among a restricted group of companies. They voluntarily join these closed, secure and exclusive environments to foster the development of new products/services and/or to improve their internal efficiency. Data may be shared for free, but fees may also be considered.

- *Technical enablers:* businesses specialised in and specifically dedicated to enabling data sharing through a technical solution. Revenues are obtained from setting up, using, and/or maintaining the solution (not from the data exchanged).

- *Open data policy:* companies that opt to share data for free to foster the development of new products and/or services.

Considering that the potential of the European data economy is just unfolding, new approaches to B2B data sharing may still emerge.

This study confirms that companies share and re-use data among them

Considering the findings from recent research, as well as the evidence collated through the European Commission's public consultation on 'Building a European data economy', this study allowed for a firmer confirmation that companies are engaged in B2B data sharing and re-use. Around 40 % of the surveyed companies reported to share and/or re-use data with/from other companies. Although results from this study or from existing research cannot be generalised, there is a clear indication that many companies are already contributing to fostering a European data economy because they decided to transfer and/or access data in business-to-business relations.

There is indication that B2B data sharing and re-use will significantly grow in a near future

Although not yet engaged in B2B data sharing and re-use, a considerable proportion of companies expects to start sharing and re-using data in the next five years. They also recognise the potential benefits of these activities. Future data suppliers expect that data sharing may help them to establish partnerships with other companies, monetise their data and generate additional revenues, and support innovation. Future data users foresee that accessing data from other companies may increase the possibility for developing new products and/or services, improve their relationship with clients, or enhance their catalogue of products. Companies also indicated the factors that can potentially increase their willingness to share data in the future, including legal clarity about "data ownership rights", ability to track the usage of data, and increased certainty about the nature of and procedures related to licensing agreements.

Companies engage in B2B data sharing and re-use to enhance their business opportunities and improve internal efficiency

Both data suppliers and data users share and re-use data with/from other companies to explore the possibility of developing new business models and/or new products and services. Additionally, data suppliers appear to engage in B2B data sharing to establish partnerships with other companies, and to generate revenue from the monetisation of their data. In turn, data users seem to be interested in accessing data from other companies to enhance their catalogue of products and/or services, as well as to improve their internal efficiency.

Investing a critical amount of money in accessing real-time or localisation/positioning data may have a positive impact on a company's business

Within the framework of this study, 'missed business opportunities' were defined as new or improved products and/or services that a company was not able to bring to the market due to the impossibility of accessing data from other companies. This study concluded that many companies seem to be missing business opportunities because presumably they did not re-use data from other companies, but particularly due to the lack of sufficient investment in accessing real-time and/or positioning/localisation data from other companies. Although the results of this study need to be interpreted with caution[14], there is an indication that companies may be able to enhance their business opportunities (i.e. bring more new or improved products and/or services to the market) if they spend a critical amount of money in acquiring real-time and/or positioning/localisation data from other companies.

Most data suppliers and data users appear to share and re-use data within their own business sector

The results from the survey provide clear indication that both data suppliers and data users tend to share and re-use data within the business sector in which they operate. The two most common types of data shared and re-used are data generated by internal IT business systems[15], along with data generated by the Internet-of-Things. From these types of data, real-time data and transactional data are the features of data most commonly shared and re-used. Application Programming Interfaces (APIs) appear to be the most preferred technical mechanism to share and re-use data with/from other companies.

Data suppliers share only a small proportion of the data they hold

Evidence from this study and previous research and consultation exercises suggests that companies provide access to a small fraction of the data they generate and/or have access to (with due permission from private individuals). Data suppliers make strategic and thoughtful choices in relation to the data they decide to share (or not). Furthermore, there may be certain features of data that are intentionally not made available to other parties to comply with relevant legislation and/or to protect private individuals.

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[14] Although the study managed to gather a suitable number of answers to the survey, they do not allow for a generalisation of results.
[15] Data generated by internal IT business systems include information about products, services, sales, logistics, customers, partners or suppliers.

Technical and legal obstacles are hindering B2B data sharing, while denial of access is a common barrier among companies re-using data

This study corroborated findings from previous research by indicating that the most common *obstacles to data sharing* are technical barriers and related costs, as well as legal obstacles. More concretely, technical barriers may include lack of interoperability, safety and security requirements, or curation and infrastructure costs. Legal obstacles may entail the uncertainty about "data ownership" and what can be lawfully done with the data, along with difficulties in meeting the legal requirements on data protection in a business-to-business context. On the other hand, *obstacles to data re-use* include denial of or discriminating and costly conditions to access relevant datasets, along with lack of interoperability and data standardisation.

Trust and simplicity are just some of the elements that help companies to successfully share data in business contexts

The insights gathered through the interviews with companies that are already engaged in B2B data sharing allowed for the identification of elements that helped companies to successfully pursue this activity. Building trust with data users and data suppliers, understanding the demand for data, establishing partnerships, identifying concrete use cases about what can be done with the data, and putting in place simple and user-friendly tools proved to be key success factors for B2B data sharing.

Recommendations for future policy-making

The European Commission should further develop the concept of B2B data sharing and related terminology together with companies and stakeholders. This will avoid misinterpretations and bridge the existing gap of knowledge and lack of understanding with regard to data sharing and re-use in business-to-business relations.

As supported by many companies and stakeholders, the European Commission and national governments should keep a minimal regulatory approach to foster B2B data sharing. In addition, soft policy measures are needed to complement the existing legal framework. The European Commission is encouraged to continue adopting policy and practice-oriented instruments, such as communications, recommendations, resolutions, toolkits or guidelines. This will bring more clarity and provide guidance to companies interested in making their data available and/or accessing data from others.

In combination with the actions above, the European Commission should organise awareness-raising campaigns to engage more companies in B2B data sharing. More concretely, the campaigns could focus on explaining the different forms data sharing can take in business-to business relations, as well as the benefits that can result from this activity. These campaigns are also aimed at ensuring that the current legal and policy

frameworks are generally known by businesses from all sizes operating in the European Economic Area.

To be able to assist companies in gaining a more practical understanding of relevant legal documents, the European Commission is called on to provide guidance in relation to relevant regulations and directives. Considering that some legal instruments have been recently reviewed and new laws are going to be issued soon, such guidance will help companies to understand well the legal framework related to B2B data sharing, what can be legally done with the data, and how to deal with cases of data misuse. In addition, the European Commission should monitor and evaluate the implementation of regulations and directives from the perspective of B2B data sharing and re-use. This will ensure that the existing legal instruments are fit for purpose and useful for European companies and citizens.

Considering that B2B data sharing and re-use is expected to grow in the next few years, the European Commission should create a B2B data sharing framework. This generic framework is intended to set out basic concepts, principles and conditions for engaging in B2B data sharing and re-use. It is also aimed at providing recommendations to successfully transfer and access data to/from other companies. The framework should be developed in close consultation with companies and stakeholders to ensure that their needs are considered, and to learn from and build on their experiences.

Considering that technical barriers to data sharing have been identified in previous research and in this study, the European Commission is encouraged to support the development of data interoperability and standards that enable data sharing and re-use in business-to-business relations.

Finally, the European Commission should fund projects that support companies to actively contribute to building a European data economy. Companies from different sizes (including SMEs) need financial support to create the necessary conditions to engage in B2B data sharing.

Résumé

Mieux comprendre le partage et la réutilisation de données entre les entreprises dans l'Espace économique européen

Suite à sa Communication « Créer une économie européenne fondée sur les données » en début 2017, la Commission européenne a lancé une étude afin de mieux comprendre le partage et la réutilisation de données dans les relations inter-entreprises dans l'Espace économique européen (EEE). Cette étude s'est déroulée du mois de juillet 2017 jusqu'au mois de février 2018, et elle visait notamment à :

- Quantifier la dimension du partage et la réutilisation de données inter-entreprises dans l'EEE

- Identifier les opportunités commerciales manquées en raison du non-accès aux données d'autres entreprises

- Déterminer les obstacles au partage et à la réutilisation de données inter-entreprises

- Identifier les facteurs de réussite pour le partage de données inter-entreprises

Cette étude avait pour cible des entreprises de différentes tailles[16] opérant dans six secteurs économiques concrets[17] dans 31 pays[18]. Elle visait particulièrement les données générées par des machines, c'est-à-dire des données générées sans intervention humaine directe, par des senseurs ou bien par des processus informatiques, des applications ou des services. L'étude ne fait pas de distinction entre données personnelles ou non-personnelles, en partant du principe que les entreprises respectent leurs obligations légales en matière de protection des données.

Des informations supplémentaires concernant l'intérêt et l'engagement actuel dans le partage de données ont été recueillies, ainsi que des perspectives sur l'écosystème de l'économie européenne fondée sur les données. Cette étude corrobore de manière générale les conclusions d'études et consultations précédentes.

Le concept de « partage de données inter-entreprises » n'est pas tout à fait connu ni compris

Bien que cette étude ait confirmé que les entreprises partagent et réutilisent d'ores et déjà des données entre elles, elle a aussi montré que le concept « partage de données inter-entreprises » n'est pas tout à fait clair ni compris. D'autant plus qu'il existe différents termes pour faire référence à l'échange de données inter-entreprises dans des

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[16] Conformément à la classification proposée par Eurostat sur la taille des entreprises, cette étude visait quatre types d'entreprises : grandes entreprises (250 employés ou plus), moyennes entreprises (de 50 à 249 employés), petites (de 10 à 49) et micro-entreprises (moins de 10 employés).

[17] Cette étude visait particulièrement six secteurs économiques : conduite connectée (automobile, transport et logistique), agriculture intelligente, manufacture intelligente, opérateurs de télécommunications, habitat intelligent (domotique, senseurs, robots ou technologie portable), et réseaux et compteurs intelligents.

[18] Les pays ciblés comprennent les 28 états membres, plus l'Islande, le Liechtenstein et la Norvège.

buts commerciaux (par exemple, « transfert de données et accès » ou « partage de données et réutilisation »), ce qui peut entraîner des malentendus sur le concept.

Cette étude propose trois axes clé pour clarifier c'est que le «partage de données dans les relations inter-entreprises» :

- Les entreprises qui s'engagent dans le partage de données n'accordent pas nécessairement l'accès à l'ensemble de leurs données de manière complète. La proportion des données que les entreprises partagent dépend généralement de leur stratégie commerciale.
- Le terme «partage» ne doit pas être compris comme synonyme de «gratuit». Il existe différents modèles économiques de «partage de données inter-entreprises» (certains pouvant comporter un paiement afin d'accorder accès aux données), et l'apparition de nouveaux modèles n'est pas exclue.
- Ce sont les entreprises en définitive qui décident avec qui elles souhaitent partager leurs données. Bien qu'il existe des réglementations en vigueur sur l'accès à certaines données, c'est aux entreprises de décider les données qu'elles souhaitent partager et sous quelles conditions d'utilisation.

Le partage de données inter-entreprises peut prendre différentes formes

Au cours de cette étude les modèles économiques suivants ont été identifiés:

- *Monétisation des données*: approche unilatérale suivant laquelle les entreprises génèrent des revenus supplémentaires en partageant leurs données avec d'autres entreprises. Ces données peuvent être également monétisées moyennant la fourniture de services.
- *Marchés de données*: il s'agit d'intermédiaires de confiance qui rassemblent des fournisseurs et des utilisateurs de données sur une plateforme en ligne sécurisée pour l'échange de données. Ces entreprises tirent leurs revenus des transactions de données faites à travers leur plateforme.
- *Plateformes de données industrielles*: approche collaborative et stratégique à l'échange des données dans un groupe limité d'entreprises. Les entreprises participantes adhèrent volontairement à ces environnements fermés, sécurisés et exclusifs pour favoriser le développement de nouveaux produits et services et/ou améliorer leur efficacité interne. Les données sont d'habitude partagées de façon gratuite, mais des frais peuvent également être considérés.
- *Facilitateurs techniques*: il s'agit d'entreprises spécialisées dans l'échange de données moyennant un outil technique. Les revenus tirés par ces entreprises proviennent de la configuration, de l'utilisation et/ou de la maintenance de l'outil technique qu'elles fournissent, et non pas des données échangées à travers celui-ci.
- *Politique de données ouvertes*: il s'agit d'entreprises qui choisissent de partager des données gratuitement pour favoriser le développement de nouveaux produits et/ou services.

Etant donné que le potentiel de l'économie des données européenne est toujours en cours de développement, l'apparition de nouvelles approches au partage de données inter-entreprises n'est pas exclue.

Cette étude confirme que les entreprises européennes partagent et réutilisent des données entre elles

Compte tenu des résultats d'études récentes, ainsi que des réponses recueillies lors de la consultation publique lancée par la Commission européenne «Construire une économie de données européenne», cette étude a permis de confirmer encore une fois que les entreprises s'engagent dans le partage et la réutilisation de données entre elles. Environ 40 % des entreprises ayant répondu au questionnaire ont déclaré être en train de partager et/ou réutiliser des données avec d'autres entreprises. Bien que les résultats issus de cette étude ou des recherches précédentes ne permettent pas de faire des généralisations, il est clair que de nombreuses entreprises contribuent d'ores et déjà à promouvoir une économie de données européenne en participant à l'échange de données avec d'autres entreprises.

Il semble que le partage et la réutilisation de données inter-entreprises pourrait s'accroître de façon notable dans les années à venir

Une proportion considérable des entreprises qui ont participé à cette étude prévoit de commencer à partager et à réutiliser des données au cours des cinq prochaines années, même si cela n'est pas le cas à présent. Ces entreprises reconnaissent également les avantages potentiels de participer à cet échange. Les futurs fournisseurs de données s'attendent à ce que le partage de données leur permette d'établir des partenariats avec d'autres entreprises, de monétiser leurs données en générant des revenus supplémentaires, et de soutenir leur capacité d'innovation. Les futurs utilisateurs de données prévoient que l'accès aux données d'autres entreprises puisse augmenter leur capacité de développer de nouveaux produits et/ou services, améliorer leurs relations avec les clients ou encore leur catalogue de produits. Ces entreprises ont également indiqué les facteurs qui pourraient les rendre plus disposées à partager des données dans le futur, notamment la clarté juridique concernant les « droits de propriété des données », la capacité de suivre l'utilisation des données une fois partagées, et plus de certitude quant à la façon de partager les données d'un point de vue contractuel.

Les entreprises s'engagent dans le partage et la réutilisation de données entre elles pour améliorer leurs opportunités commerciales et leur efficacité interne

Les fournisseurs de données, aussi bien que les utilisateurs de données, partagent et réutilisent des données avec d'autres entreprises afin d'explorer la possibilité de développer de nouveaux modèles d'affaires et/ou de nouveaux produits et services. De plus, les fournisseurs de données semblent s'engager dans le partage de données avec d'autres entreprises pour établir des partenariats et générer des revenus en monétisant leurs données. À leur tour, les utilisateurs de données semblent être intéressés à accéder aux données d'autres entreprises pour améliorer leur catalogue de produits et/ou de services, ainsi que pour améliorer leur efficacité interne.

Investir une somme critique pour accéder à des données en temps réel ou de positionnement peut avoir un impact positif sur les affaires d'une entreprise

Dans le cadre de cette étude, les «opportunités commerciales manquées» ont été définies comme des produits et/ou services nouveaux ou améliorés qu'une entreprise ne réussit pas à mettre sur le marché face à l'impossibilité d'accéder à des données d'autres entreprises. Cette étude permet de conclure que de nombreuses entreprises semblent manquer des opportunités commerciales du fait de ne pas avoir réutilisé des données provenant d'autres entreprises, et plus particulièrement en raison d'un manque d'investissement suffisant pour accéder à des données en temps réel et/ou de positionnement. Bien que les résultats de cette étude doivent être interprétés avec prudence[19], il semblerait que les entreprises pourraient améliorer leurs opportunités commerciales (c'est-à-dire introduire davantage de produits et/ou des services nouveaux ou améliorés sur le marché) en dépensant une somme critique pour acquérir des données en temps réel et/ou de positionnement d'autres entreprises.

La plupart des fournisseurs et des utilisateurs de données semblent partager et réutiliser les données dans leur même secteur économique

Les résultats du questionnaire indiquent clairement que les fournisseurs de données, aussi bien que les utilisateurs de données, ont une tendance à partager et à réutiliser les données dans leur même secteur d'activité. Les deux types principaux de données partagées et réutilisées par les entreprises sont celles générées par les systèmes informatiques internes[20], ainsi que celles générées par l'Internet des Objets. Parmi ces types de données, les données en temps réel et les données transactionnelles sont les caractéristiques les plus partagées et réutilisées. Les interfaces de programmation applicatives (API) semblent être le mécanisme technique préféré pour échanger des données avec d'autres entreprises.

Les fournisseurs de données ne partagent qu'une petite partie des données qu'ils détiennent

Cette étude, tout comme d'autres études et consultations précédentes, suggèrent que les entreprises ne partagent qu'une petite fraction des données qu'elles génèrent et/ou auxquelles elles ont accès (avec la permission des particuliers). Les fournisseurs de données font des choix stratégiques et réfléchis par rapport aux données qu'ils décident de partager ou pas. En outre, ils peuvent décider de ne pas mettre à disposition certaines caractéristiques des données qu'ils détiennent afin de respecter le droit applicable et/ou de protéger les particuliers.

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[19] Malgré avoir recueilli un nombre adéquat de réponses au questionnaire, l'échantillon ne permet pas de faire des généralisations sur l'ensemble de la population.
[20] Les données générées par les services informatiques internes peuvent inclure des renseignements sur les produits, les services, les ventes, la logistique, les clients, les partenaires ou les fournisseurs.

Des obstacles techniques et juridiques empêchent le partage de données avec d'autres entreprises, tandis que le refus d'accès est un obstacle fréquent chez les réutilisateurs

En accord avec des études précédentes, cette étude a confirmé encore une fois que ce sont les questions techniques et les coûts associés, ainsi que les questions juridiques, les *obstacles les plus fréquents au partage de données*. Les obstacles techniques peuvent inclure le manque d'interopérabilité, les exigences de sûreté et de sécurité, et les coûts de conservation ou liés à l'infrastructure. Quant aux obstacles juridiques, ils peuvent découler de l'incertitude sur la «propriété des données» et ce qui peut être fait de bon droit avec elles, ainsi que des difficultés à respecter les exigences légales en matière de protection de données dans un contexte inter-entreprises. D'un autre côté, les *obstacles à la réutilisation de données* comprennent le refus d'accès aux données ou la discrimination et l'imposition de conditions coûteuses pour accéder à celles-ci, ainsi que le manque d'interopérabilité et de normalisation du format des données.

La confiance et la simplicité, des facteurs qui aident les entreprises à partager davantage de données entre elles

Les informations recueillies lors des entretiens avec des entreprises déjà engagées dans le partage de données avec d'autres entreprises ont permis d'identifier les facteurs qui les ont aidé à poursuivre cette activité avec succès. Nourrir la confiance entre les utilisateurs de données et les fournisseurs de données, bien cerner la demande de données, établir des partenariats, identifier des cas d'utilisation des données concrets, et mettre en place des outils simples et conviviaux apparaissent comme étant des facteurs clé de succès dans le partage de données inter-entreprises.

Recommandations pour la formulation de futures politiques

La Commission européenne devrait développer davantage le concept de « partage de données inter-entreprises » et la terminologie associée en partenariat avec les entreprises et les parties prenantes. Cela permettrait d'éviter des interprétations erronées et de surmonter le manque de compréhension actuel concernant le partage et la réutilisation de données dans les relations inter-entreprises.

Comme revendiqué par plusieurs entreprises et parties prenantes, la Commission européenne et les gouvernements nationaux devraient minimiser la réglementation pour favoriser le partage de données inter-entreprises. En revanche, des mesures politiques non-contraignantes sont nécessaires pour compléter le cadre juridique existant. La Commission européenne est ainsi invitée à continuer d'adopter des instruments politiques et d'appui, tels que des communications, des recommandations, des résolutions, des guides ou des lignes directrices. Cela apporterait plus de clarté sur ce sujet et pourrait fournir des conseils aux entreprises intéressées à rendre leurs données disponibles et/ou à accéder aux données d'autres entreprises.

Outre les actions décrites ci-dessus, la Commission européenne devrait organiser des campagnes de sensibilisation afin d'impliquer davantage d'entreprises dans le partage de données. Ces campagnes pourraient se consacrer à présenter les différentes formes que le partage de données peut prendre dans les relations inter-entreprises, ainsi que les avantages pouvant résulter de ces échanges. Ces campagnes pourraient viser également à faire en sorte que les cadres juridiques et politiques actuels soient connus par les entreprises de toutes tailles opérant dans l'Espace économique européen.

Afin d'aider les entreprises à acquérir une compréhension plus pratique des instruments réglementaires pertinents, la Commission européenne est appelée à fournir des orientations concrètes sur l'application de ces instruments. Puisque certains instruments juridiques ont été récemment revus et que de nouvelles lois seront bientôt adoptées, ces conseils aideront les entreprises à mieux comprendre le cadre juridique qui s'applique au partage de données dans un contexte inter-entreprises, ce qu'elles peuvent faire de bon droit avec les données, et comment agir en cas d'usages abusifs. De plus, la Commission européenne est appelée à surveiller et à évaluer la mise en œuvre des réglementations et des directives sous l'angle du partage et de la réutilisation de données inter-entreprises. Elle assurerait ainsi que les instruments juridiques existants conviennent à l'objectif poursuivi et aux entreprises et aux citoyens européens.

Etant donné que le partage et la réutilisation de données entre les entreprises devraient augmenter au cours des prochaines années, la Commission européenne est encouragée à formuler un cadre politique à cet égard. Ce cadre générique aurait pour but de définir les concepts, les principes et les conditions de base pour favoriser le partage et la réutilisation de données entre les entreprises. Il viserait également à fournir des recommandations concrètes aux entreprises pour mettre à disposition leurs données et/ou accéder aux données des autres avec succès. La Commission est encouragée à travailler sur ce cadre en étroite coopération avec les entreprises et les parties prenantes afin de prendre en compte leurs besoins et de profiter de leur expérience.

Considérant que des obstacles techniques au partage des données ont été identifiés aussi bien dans cette étude que dans des études précédentes, la Commission européenne est encouragée à soutenir l'interopérabilité des données et le développement de normes favorisant le partage et la réutilisation de données entre les entreprises.

Enfin, la Commission européenne devrait financer des projets pour aider les entreprises à contribuer activement à la construction d'une économie européenne des données. Des entreprises de toutes les tailles (y compris notamment les PME) ont besoin d'un soutien financier pour créer les conditions nécessaires au partage de données inter-entreprises.

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1. Introduction

The European Commission is committed to building a *European data economy*. Since 2014, several policy initiatives have been undertaken by the European Commission to draw attention to the potential of data to generate economic growth, competiveness and innovation, create jobs, and contribute to societal progress. More concretely, the exchange of data in certain sectors appears to hold great potential, such as intelligent transport systems, food security, climate, energy, or health[21]. At the same time, throughout the last years, the European Commission has also been interested in deepening its understanding about the free flow of data, access to and transfer of data between companies, liability issues on emerging technologies, or data portability and interoperability, as well as standards to improve both. Therefore, several studies have been conducted to shed some light on how to fully tap the potential of data.

In order to build further on existing knowledge and to contribute to developing a policy framework that enables data to be shared and re-used between companies in Europe, the European Commission contracted *everis* to carry out a study to measure the economic value and understand the potential of data sharing and re-use in business-to-business relations within the European Economic Area (EEA, i.e. the 28 EU Member States, Norway, Iceland and Liechtenstein). More specifically, this study aimed at:

- Estimating the quantitative dimension of data sharing and re-use between companies inside the EEA

- Ascertaining missed business opportunities resulting from the lack of access to relevant data

- Determining the obstacles to data sharing and re-use between companies

- Identifying success factors for B2B data sharing

Following the description of the methodological approach, this report provides an overview of the most recent developments in terms of policy and legislative frameworks on data sharing and re-use in business-to-business relations, along with a discussion of the findings of relevant studies in this field. A statistical analysis of the data collected is presented to quantify data sharing and re-use within the EEA. Illustrative cases of companies sharing data are examined in this report, alongside an in-depth analysis of obstacles to and success factors for data sharing. Lessons learnt by the companies featuring in the case studies are shared in this document. Finally, the main conclusions of the study are presented together with evidence-based recommendations to support future policy-making in the field of data sharing and re-use between companies in the EEA.

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[21] European Commission (2017), *Building a European Data Economy*, COM(2017) 9 final, 10.1.2017, available at: http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=41205

2. Methodological approach

This chapter discusses the overall concept of data sharing, clarifies the scope of the study, and presents the methodological approach that was followed for the data collection and for the data analysis. Finally, the limitations of the study are enumerated.

2.1. Understanding the overall concept of data sharing between companies

The concept of *B2B data sharing* is generally used to refer to the exchange of data between companies. This concept comprises both the supply and the demand side of data exchange by encompassing both those companies that make data available and those that are granted access to data. Within the framework of the present study, the term of '**data sharing**' is strictly limited to the data supply side, namely the companies that generate or store data and make them available to other companies, either for free or against some kind of remuneration or compensation, including economic or in kind. Conversely, the concept of '**data re-use**' specifically refers to the demand side, that is to say companies that access data from other companies following a non-rivalry approach (i.e. among companies in a non-competitive market). The concepts of 'data sharing' and 'data re-use' underpinning this study are defined hereafter.

DATA SHARING	DATA RE-USE
The process by which a company makes their data available, either at no cost or against some remuneration or benefit, to another company that is neither a market competitor nor a sub-contractor and is interested in these data for business purposes. The data were generated or collected by the company sharing the data.	The process by which a company re-uses data from another company, which is not a direct market competitor, for its own business purposes (excluding contractor-subcontractor relationships). These data were either accessed for free or acquired against some remuneration or other kind of compensation, including the provision of a service.

Figure 1. Definition of data sharing and data re-use

It is worth highlighting that the scope of this study excludes the situation of sub-contracting between two economic operators for the purposes of data re-use (i.e. the study did not consider companies that are sub-contracted to re-use data acquired from another company). This study departs from the general assumption that companies claiming to share or re-use data have the right or hold a valid licence to do so.

2.2. Scope of the study

The scope of the study is described in detail hereafter, including the types of data considered, the geographical coverage, the targeted company sizes, and the selected business sectors.

2.2.1. Types of data

The study focuses on sharing and/or re-using of **machine-generated data**, identified in the Commission's Package on 'Building a European Data Economy'[22] as a key priority of data sharing. Such type of data, *"created without the direct intervention of a human by computer processes, applications and services or by sensors"* (p. 9)[23], includes:

- Data generated by the Internet-of-Things (IoT) and physical devices, including sensors or mobile phones

- Data generated by internal IT business systems, mainly containing information about products, services, sales, logistics and customers, partners or suppliers (CRM[24], ERP[25], etc.)

- Data generated through users' interaction with websites (i.e. cookies, web tracking, logs), which contain information about a user's behaviour on a particular website or when surfing the web, about his/her interests and preferences, etc.

- Data generated through crowdsourcing or web collaboration.

Whilst the data outlined above are mainly generated by machines, they may still involve some **degree of human intervention** or inputting, especially with regard to the data collected from customers, partners and suppliers via forms, emails, CRM systems, etc.

This study does not distinguish between sharing or re-use of personal and non-personal data. As far as personal data is concerned, it is assumed that companies comply with the applicable data protection legislation, in particular the General Data Protection Regulation (GDPR) soon in force (May 2018).

2.2.2. Geographical coverage

The present study is aimed at deepening the understanding about the quantitative and qualitative dimensions of data sharing and re-use between companies within the European Economic Area (EEA). Nevertheless, considering the objectives of this study, the timeline and resources available, efforts were targeted at retrieving evidence from 17 countries, namely: Belgium, Croatia, Estonia, France, Germany, Ireland, Italy, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, and the United Kingdom. The process to select this sample is explained in more detailed in annex 1.

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[22] European Commission, *Building a European Data Economy*, COM(2017) 9 final, 10.1.2017
[23] Ibid.
[24] Customer Relationship Management.
[25] Enterprise Resource Planning.

2.2.3.   Company sizes

This study considers companies with four different sizes as shown in the diagram below. These categories are in line with Eurostat's classification of 'enterprise size'[26].

| **Large** | **Mid** | **Small** | **Micro** |
| 250 or + employees | 50 to 249 employees | 10 to 49 employees | Fewer than 10 employees |

Figure 2. Company sizes considered in the study

2.2.4.   Business sectors

The study particularly focuses on six business sectors: data-generating driving, smart agriculture, smart manufacturing, telecom operators, smart living environments, and smart grids & meters. These sectors were selected together with DG CONNECT based on the information compiled in the Staff Working Document accompanying the Communication on 'Building a European data economy' (2017)[27]. Some of these sectors had already been identified in a prior study carried out for the European Commission in 2014[28]. The selected business sectors are briefly defined below.

Data-generating driving

DATA-GENERATING DRIVING refers to motor vehicles connected to integrated or external devices (such as a smart phone, a GPS, a tachograph or an electronic toll collection device), which are equipped with a multitude of sensors with wired or wireless connection to communication networks (e.g. GPRS or GSM gateways, and telematics). These devices/sensors may *collect data while driving* about the vehicle's performance, trajectory, speed, and driver's behaviour, etc. to inform third parties about performance status, location, distance, stops, fuel consumption, traffic, changes on the road, parking availability, as well as to improve road safety and prevent failure or breakdowns or alert emergency services. The data collated are primarily intended to optimise products and/or services provided by companies (which are capable and legally authorised to gather

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[26] Enterprise Size classification available at: http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Enterprise_size. Last checked on 02/08/2017.
[27] European Commission (2017), *Staff working document on the free flow of data and emerging issues of the European data economy accompanying the Communication "Building a European data economy"* (SWD(2017) 2 final), p. 25 and following.
[28] IDC and TXT (2014), *Definition of a Research and Innovation Policy Leveraging Cloud Computing and IoT Combination*, p. 40, available at: https://ec.europa.eu/digital-single-market/en/news/definition-research-and-innovation-policy-leveraging-cloud-computing-and-iot-combination

and read data from the devices and the vehicle) and/or to develop new features. Although some sensors are intended to automate certain operations, automated or autonomous vehicles should be considered as a separate concept and out of the scope of this study, even if both technological developments are happening in parallel and share challenges and opportunities[29].

Examples of companies targeted: original equipment manufacturers within the automotive sector; navigation, traffic and map companies; technology providers; automobile repair shops; insurance companies; transport and logistics companies; roadside assistance providers; toll collection systems; infotainment service providers; other companies operating in the automotive and transport sector.

SMART AGRICULTURE or smart farming[30] are broader concepts which refer to the application of ICT into agriculture. They encompass not only the use of 'precision farming' technology, but also the exploitation and analysis of the data collected through these technologies, as well as the application of robotics, automatic control and artificial intelligence techniques at all levels of agricultural production[31]. In turn, precision agriculture is a modern farming management concept that uses digital techniques (including sensor technologies, satellite navigation and positioning technology, and the Internet of Things) to monitor and optimise agriculture production processes[32]. Its aim is to enhance the quality and quantity of crop yields and animal performance while using less input (water, energy, fertilisers, pesticides, etc.), by giving each plant or animal exactly what it needs to grow optimally[33]. Ultimately, precision farming supports more and better food, thereby contributing to food security and safety, while saving costs and reducing the environmental impact of agriculture.

Smart agriculture

Examples of companies targeted: farmers and breeders; farmer associations and cooperatives; technology providers; crop chemical companies; seed developers; agricultural equipment and machinery

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[29] European Commission (2016), *Roadmap on Highly Automated vehicles (GEAR 2030 Discussion Paper)*, available at: https://circabc.europa.eu/sd/a/a68ddba0-996e-4795-b207-8da58b4ca83e/Discussion%20Paper%C2%A0-%20Roadmap%20on%20Highly%20Automated%20Vehicles%2008-01-2016.pdf
[30] Beecham Research (2014), "Towards smart farming agriculture embracing the IoT vision", available at: https://www.beechamresearch.com/files/BRL%20Smart%20Farming%20Executive%20Summary.pdf
[31] Ibid.
[32] European Parliamentary Research Service, EPRS (2016), "Precision agriculture and the future of farming in Europe", *Scientific Foresight Study*, available at: http://www.europarl.europa.eu/RegData/etudes/STUD/2016/581892/EPRS_STU(2016)581892_EN.pdf, p.1.
[33] European Agricultural Machinery (2017), "Digital farming: what does it really mean?", 13 February 2017, available at: http://cema-agri.org/sites/default/files/CEMA_Digital%20Farming%20-%20Agriculture%204.0_%2013%2002%202017.pdf

manufacturers.

SMART MANUFACTURING is a technology-driven approach that uses Internet-connected machinery to monitor in real-time the production process[34], identify opportunities for automated or semi-automated operations, and use data analytics to optimise manufacturing performance, enable preventive maintenance and avoid downtime on devices[35]. The aim is to achieve a sustainable and competitive manufacturing where workers interact, share tasks and collaborate with robots along the production chain. This concept is also often referred to as 'factories of the future' or as 'Industry 4.0'. In addition to its impact on competitiveness, growth and employment, smart manufacturing is also expected to have a positive environmental impact by reducing energy consumption and waste generation, as well as a social impact.

Examples of companies targeted: product manufacturers; machine manufacturers; maintenance services; robot manufacturers; technological suppliers/software vendors.

TELECOM OPERATORS are companies offering publicly available telephone services in a fixed or a mobile network including managed VoIP (voice over IP)[36]. Big data offers a big potential for the telecom industry to improve its internal services and the management of its infrastructure, by predicting the periods of high usage and find ways to relieve congestion, identify customers most likely to have billing problems, provide insights into users decision to leave, make personalised offers, detect fraud, etc.[37]. In addition, through the data generated from a mobile network, especially location data, telecom operators can provide meaningful information for a number of sectors, such as: retail, transport, financial services, healthcare and marketing, that can make use of the potential of sophisticated profiling and segmentation analysis offered by enriched mobile data.

Examples of companies targeted: mobile network operators

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[34] Enterprise insights, "What is smart manufacturing?" (20 June 2017), available at: http://enterpriseiotinsights.com/20170620/channels/fundamentals/20170619channelsfundamentalswhat-is-smart-manufacturing-tag23-tag99

[35] According to the National Institute of Standards and Technology (NIST) SM systems are "fully-integrated, collaborative manufacturing systems that respond in real time to meet changing demands and conditions in the factory, in the supply network, and in customer needs." See: http://cdn2.hubspot.net/hubfs/103829/Ebooks_Whitepapers/CMTC-Smart-Manufacturing_Ebook_Final.pdf?t=1447635663388

[36] European Commission, "Definitions of the Telecommunication indicators used in the EUROSTAT telecommunications inquiry", available at: http://ec.europa.eu/eurostat/cache/metadata/Annexes/isoc_tc_hist_esms_an1.pdf

[37] McDonald Carol (2017), "Big Data opportunities for Telecommunications", available at: https://mapr.com/blog/big-data-opportunities-telecommunications/

(MNO); wireless service providers; fixed network operators; mobile broadband operators; cable operators; mobile virtual operators.

SMART LIVING ENVIRONMENTS or 'smart homes' are broad terms used to describe living spaces, which interact with one another and/or with their inhabitants through technology, transforming the way we live at home by introducing home automation through controlled lighting, heating, ventilation, but also improved convenience, comfort, energy efficiency and security[38]. The concept of 'smart home' is also applied in the field of healthcare and is closely linked to 'independent living' and 'ambient assisted living' (AAL). It refers to home automated features and innovative/ingenious home products and solutions powered by technology (mainly wearable sensors or placed inside the home) which allow the elderly and the disabled to independently and safely stay in their homes as long as possible. For example, automation can help the elderly and people with reduced mobility to be independent in their homes by opening/closing windows and doors or switching lights using remote control units. Access to data collected by wearable sensors, including biosensors or fall detection sensors[39], can be particularly useful for health institutions and caregivers, as well as for emergency service providers, to monitor patients in their homes remotely.

Examples of companies targeted: home automation companies; providers of sensors, emergency buttons and robotics; wearable technology providers; other companies operating in the smart home sector.

SMART GRIDS are electricity networks that use digital and other advanced technologies to monitor and manage the transport of electricity from all generation sources to meet the varying electricity demands of end-users[40]. Smart grids are also applied to other energy sources, such as oil, gas and water, but electricity still represents the main use case.[41] **SMART METERING SYSTEMS** are a component of smart grids that can be defined as *"electronic systems that can measure energy consumption and generation,*

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[38] Business Innovation Observatory (2014), "Smart Living: Ingenious home products" (DG Enterprise), available at:
http://ec.europa.eu/DocsRoom/documents/13407/attachments/4/translations/en/renditions/native
[39] Ni, Qin, Garcia Hernando, A.B and Pau de la Cruz, I. (2015), "The Elderly's Independent Living in Smart Homes: A Characterization of Activities and Sensing Infrastructure Survey to Facilitate Services Development, *Sensors 2015*, 15, pp. 11312-11362, available at: http://www.mdpi.com/1424-8220/15/5/11312/pdf
[40] International Energy Agency (2011), "Technology roadmap – Smart Grids", available at:
https://www.iea.org/publications/freepublications/publication/smartgrids_roadmap.pdf, p.6.
[41] IDC and TXT (2014), *Definition of a Research and Innovation Policy Leveraging Cloud Computing and IoT Combination*, *op.cit*. p.44.

providing more information than a conventional meter, and that can transmit and receive data for information, monitoring and control purposes, using a form of electronic communication"[42]. Smart metering data can be beneficial for national distribution system operators (DSOs), for consumers (both households and businesses) and for the environment, by improving energy efficiency, curbing CO_2 emissions and allowing for a more efficient use of intermittent renewable energy sources. Meter data can also be useful to help fraud detection and to predict maintenance requirements and potential power failures or equipment downtime.

Examples of companies considered: electricity suppliers; distribution system operators; transmission system operators; renewable energy providers; other companies operating in the sector of smart grids and smart metering.

2.3. Methodology

A methodological approach was developed to be able to achieve the objectives set for this study. An overview of this approach is provided in the visualisation and subsections below. The research questions guiding the study are listed hereafter and the methodological approach followed is also briefly described. A detailed description of the methodology can be found in annex 1.

Methodological Framework
- Robust methodological approach
- Research questions
- Identification of companies & key stakeholders

Data collection
- Desk research
- Online survey
- Semi-structured interviews
- Webinars

Data analysis
- Literature & documentary review
- Quantification of data sharing and re-use
- Estimation of missed business opportunities
- Content analysis
- Identification of success factors and obstacles
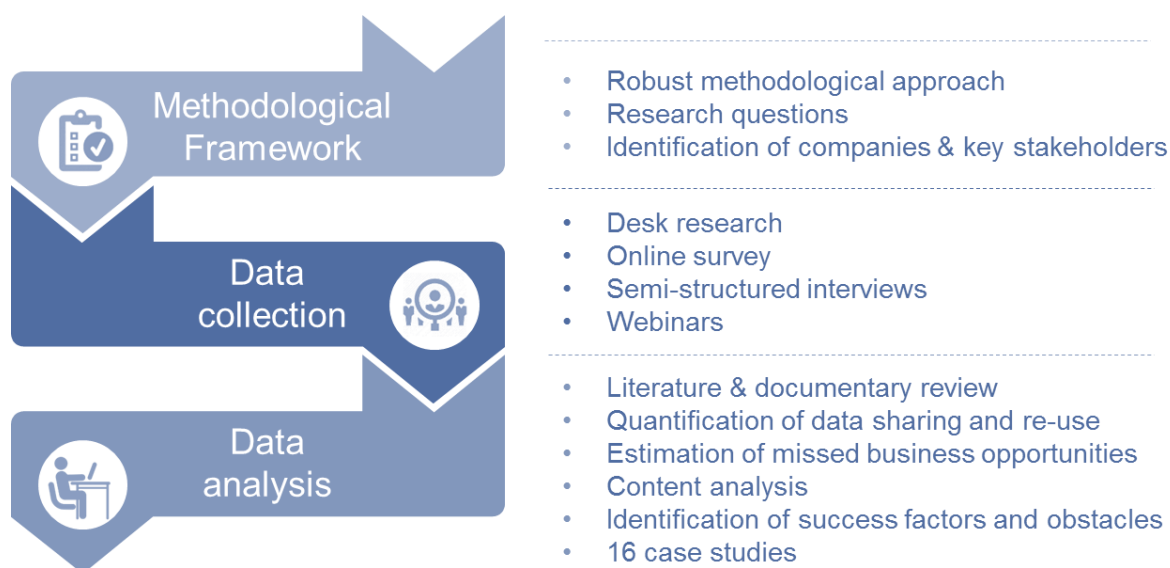- 16 case studies

Figure 3. Overview of the methodological approach followed

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[42] European Commission, Proposal for a Directive on common rules for the internal market in electricity (2016/0380(COD)), available at:
http://www.europarl.europa.eu/RegData/etudes/BRIE/2015/568318/EPRS_BRI%282015%29568318_EN.pdf
(Article 2: definitions)

2.3.1.   Research questions

In order to design a sound methodological approach for the present study, research questions were carefully formulated for each specific objective as formulated in the request for proposal. These are listed below.

OBJECTIVE 1: QUANTIFICATION OF DATA SHARING AND RE-USE BETWEEN COMPANIES

- What is the quantitative dimension of data sharing and re-use between companies within the EEA?

- What are the conditions for sharing and re-using data among companies?

- How are data shared and re-used between companies?

- What is the overall economic importance of data sharing and re-use among companies put in relation to other relevant economic indicators?

OBJECTIVE 2:   QUANTIFICATION   OF   NON-SHARING   AND   MISSED   BUSINESS OPPORTUNITIES

- What is the proportion of data that companies are not sharing among them?

- What are the missed business opportunities resulting from non-sharing data between companies?

- What are the obstacles to data sharing and re-use between companies?

- What are the factors that may contribute to increasing data sharing and re-use?

OBJECTIVE 3: UNDERSTANDING SUCCESS FACTORS FOR DATA SHARING

- What are key success factors for data sharing?

2.3.2.   Approach to data collection

A **desk research** was carried out to identify relevant academic and grey literature in the field of data sharing and re-use between companies. Moreover, policies and legislation in this area which are applicable to the EU and EEA levels were gathered. The desk research was also aimed at identifying companies that are already sharing data with other companies to assess their potential to be showcased in the present study.

An **online survey** was set up to gather information and data from companies operating in the European Economic Area (EEA). The survey questionnaire was carefully designed and pilot-tested to ensure that all research questions were adequately addressed. The questionnaire was translated into a limited number of languages to guarantee a higher

participation rate from companies. The survey was sent to[43] 1071 companies operating in the EEA, as well as to 941 stakeholders including umbrella organisations which are lobbying for relevant topics within each of the business sectors at international, European and national level, 31 national ministries overseeing policies related to enterprises, 28 permanent representations to the EU, start-up incubators, and member organisations of the European Enterprise Network for the 17 selected countries.

Sixteen **semi-structured interviews** were conducted with companies already engaged in B2B data sharing in order to gather insightful information to describe case studies. These are generally aimed at discussing obstacles to data sharing and how these were overcome, identifying success factors for data sharing, reporting on lessons learnt, and providing inspiration to other companies to start sharing data.

Complementary to the interviews, four **webinars** were organised. Fifty-four participants joined the webinars, including representatives of companies, associations, academia, and EU officials. The webinars were oriented to gathering additional information from the identified companies by giving them the opportunity to showcase their experiences, and to further discussing obstacles to and success factors for data sharing between companies. Additionally, the webinars were also aimed at debating recommendations for future policy-making in this field. Ultimately, the webinars were intended to further promote data sharing and re-use between companies in the EEA.

Finally, a **conference** was organised to share the preliminary findings from the study and to collate further insights in relation to future policy recommendations to foster a European data economy. Approximately 100 participants attended and actively contributed to the discussions in a one-day event in Brussels. The input gathered has been processed to complement the recommendations for future policy-making.

2.3.3.   Approach to data analysis

A **literature review** was conducted of existing research in the field of data sharing and re-use between companies in the European Economic Area (EEA). A **descriptive analysis** of the policy and legislative framework in this area at EU and EEA level was done. The goal was to understand the current state-of-play in relation to data sharing and re-use in business-to-business relations in order to build on existing knowledge and grasp the specificities of the current policy and legal frameworks which impact on companies' data sharing and re-use activities.

An analysis of the data collected through the survey was undertaken to identify interesting patterns in the data. Particularly, a number of **descriptive statistics** were used to fully understand the data gathered. Based on these insights, a **statistical model** was developed to predict variables of interest.

A **content analysis** of the transcribed interviews was performed using MAXQDA (a qualitative data analysis software). Sixteen case studies of companies currently sharing data were described (see annex 4) based on the information collated through the interviews. More specifically, the following dimensions were analysed: motivation to share data with other companies, business model, type of data shared, technical

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[43] A database of companies and stakeholders was specifically compiled for the purposes of the present study.

mechanisms and skills needed to successfully share data with other companies, obstacles to and success factors for data sharing, and lessons learnt according to companies' experiences. Complementary to the content analysis, a **documentary review** of information and documentation provided by the companies and/or collected by the team was carried out to better contextualise the case study. The webinar discussions were carefully considered to draw further conclusions in relation to obstacles to and success factors for data sharing, and to suggest policy recommendations that take into account different perspectives from companies, organisations representing common interests of companies, as well as academia.

2.3.4. Limitations of the study

The limitations of this study are mainly related to its **timeframe and short duration**. Part of the fieldwork (survey and interviews) had to be postponed to a later stage to avoid the traditional summer holiday period as it would most likely impact on the response rate to the survey and availability to give information for the case studies. A longer duration of the fieldwork could have helped to collect additional answers to the survey and to identify other case studies.

The **survey questionnaire** was only made available in a **limited number of languages** (i.e. English, Estonian, French, German, Italian, Polish, Portuguese, Romanian and Spanish). This may have impacted on the understanding of the questionnaire and eventually limited the number of responses received.

Although a glossary was made available to clarify concepts used in the survey (such as 'data sharing'), **misconceptions and misinterpretations about certain terms** could not be avoided. As concluded in this study, there appears to be a general lack of understanding about what data sharing in business-to-business relations means. This may have deterred some companies from participating both in the survey and in the interviews.

Finally, the **study's sample is not statistically representative** due to the impossibility of collecting a reasonable number of answers from all business sectors and company sizes in each country. To be able to ensure a statistically representative sample more time and resources would be required. Nevertheless, efforts to collect enough answers to provide a basis for the quantification of data sharing and re-use between companies were undertaken (including sending direct messages to key profiles in companies to invite them to participate in the survey, and the involvement of stakeholders and utilisation of social media to disseminate it).

3. Recent developments concerning data sharing and re-use between companies in the European Economic Area

This chapter describes in detail recent policy and legal developments and discusses research findings from studies concerning data sharing and re-use by European companies. More concretely, besides the policies and legislation which are specific to the context of the European Data Economy, other initiatives on sharing and re-use of data relating more specifically to each of the sectors targeted in this study are also briefly presented in the first section of this chapter. While all policy and legal initiatives discussed below have direct relevance only for EU Member States, in practice all of them have an impact on B2B data sharing and re-use in the whole European Economic Area. Exceptionally, the General Data Protection Regulation (GDPR) is expected to be applicable to all 31 countries of the EEA. Finally, to support and guide policy-making in the field of data sharing and re-use, over the years, the European institutions, and notably the Commission, have requested a number of studies on the topic. As this study builds on their findings, these will be outlined in a subsequent section in greater detail.

3.1. Policy and legal initiatives at the EEA level

In recent years, a variety of legal and policy initiatives have been taken up at the European level to promote data sharing and re-use between companies. The crucial importance of data as key assets for the prosperous development of the European economy and the need to address this topic on the European level have been widely acknowledged by different institutions. As early as October 2013, the European Council[44] set the strategic agenda by calling for action in the field of integrating the digital single market, fostering data-driven innovations in all economic sectors, making substantial investments in the area of the European digital economy, as well as promoting strategic technologies, to improve access to and sharing of data across the economy. The Council conclusions already identified cloud computing as a key enabler for improving access to and transfer of data in general, without making any direct reference to companies. In the last few years, the emphasis has been put on ways to foster data sharing and re-use particularly among companies, as a way to deliver better services and increase productivity.

3.1.1. Policies driving the data economy at EU level

Responding to the Council conclusions, in July 2014, the Commission published the Communication **Towards a thriving data-driven economy**[45]. This document acknowledged that Europe was generally lagging behind the United States in terms of its ability to embrace the enormous opportunities arising due to the growing importance of data. A lack of funding for research and innovation on data, as well as the complexity of

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[44] European Council (2013). *Conclusion*s, EUCO 169/13, 25.10.2013, available at:
http://data.consilium.europa.eu/doc/document/ST-169-2013-INIT/en/pdf, pp. 1-2.
[45] European Commission (2014), *Towards a thriving data-driven economy*, COM(2014) 442 final, 2.7.2014, available at: http://ec.europa.eu/newsroom/dae/document.cfm?action=display&doc_id=6210.f

the legal environment and the insufficient access to large datasets by businesses, and especially SMEs, were also recognised. At the same time, the importance and significant growth potential in Big Data technology, data analytics and services for Europe were addressed, especially in the health, agriculture, manufacturing, and transport sectors. The Commission therefore highlighted the need to put in place an appropriate policy framework to provide for an environment of legal certainty and facilitate business operations involving Big Data. This was envisaged to be achieved by making data more easily re-usable for humans and machines, by eliminating unnecessary barriers and restrictions to access data, and by harmonising rules on data re-use to reduce transaction costs for businesses. In addition, the Commission set out some key features of a thriving data-driven economy, the most relevant ones of which are illustrated in the figure below.
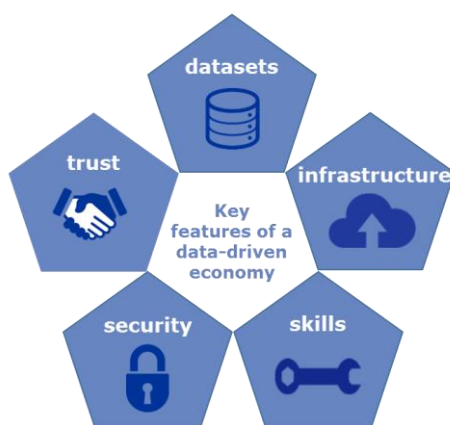
Figure 4. Key features of a thriving data-driven economy

Key characteristics of a thriving data-driven economy include, amongst others, the availability of datasets from actors across the economy, the necessary infrastructure to enable businesses to access data across sectors, markets, borders, and languages, and the existence of knowledge and skills within companies that would make possible to engage in data sharing and re-use. Other features included the existence of trust between independent economic operators, appropriate cyber-security measures, and the development of common standards for technologies and data interoperability. Finally, the Commission announced future policy actions to overcome existing limitations to data exchange.

Following up to this, in May 2015, the Commission set out its **Digital Single Market (DSM) Strategy**[46], defining the creation of an integrated digital single market as one of its key policy priorities. The overall objective was to maximise the growth potential of the European Data Economy, with a strong focus on the role of Big Data. The strategy aimed, among others, at defining a regulatory framework addressing and removing current barriers and restrictions to the free flow of data. Identifying a shift towards a new business environment in which knowledge, information, and data can be shared and re-

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[46] European Commission (2015), *A Digital Single Market Strategy for Europe*, COM(2015) 192 final, 6.5.2015, available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52015DC0192&from=EN

used in new ways, the Commission recognised the vast growth potential across all economic sectors, particularly however in the fields of transport (e.g. intelligent transport systems) and energy (e.g. smart grids, metering). More specifically, the need for a resilient telecoms sector being able to reliably handle growing amounts of data was stressed as a key ingredient for facilitating the exploitation of Big Data for businesses.

Despite focusing on personal data and on the role of data for public service procurement, the DSM Strategy also clearly demonstrated awareness of challenges for businesses regarding the use and re-use of non-personal, machine-generated data. In this light, a **'Free flow of data' initiative** was announced within the framework of the DSM Strategy, specifically addressing the sharing of machine-generated and machine-to-machine data in a B2B context. This initiative should tackle limitations on the free movement of data for reasons other than personal data protection and unjustified data location restrictions for storage or processing purposes.

In January 2017, the Commission published the Communication on **Building a European Data Economy**[47], accompanied by the **Staff Working Document on the free flow of data and emerging issues of the European data economy**[48]. These documents generally acknowledged that a thriving data economy requires companies to have access to large and diverse datasets, while ensuring at the same time that the protection of personal data is fully respected. It is worth noting that both documents focus on *machine-generated data*, namely data created without the direct intervention of a human by computer processes, applications or sensors, whether of a personal or a non-personal nature.

Two important dimensions were recognised and discussed in the Communication: 1) data localisation restrictions imposed on companies by Member States (either in the form of legislation or administrative decisions) requiring that certain data be stored and processed only within that specific country, and 2) barriers to data access and transfer in business-to-business relations. The Communication points to the free movement of data in the EU a fundamental principle, while acknowledging that data localisation requirements may be justified in particular contexts or with regard to certain data. On the second element, the Communication discusses whether there is a set of barriers that specifically limit the access and exchange of data in B2B relations. These include, for instance, the fact that some data suppliers keep the data generated by their machines for themselves, the lack of user-friendly tools to access and/or make data available, difficulties in estimating the value of the data, or the fear by some companies of losing their competitive advantage if their data become available to competitors. The Communication concludes that data are very often either analysed in-house by the company that generates them, or sub-contracted to analytics services (78 % of the companies surveyed in an ongoing study that is referred to in this Communication). In

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[47] European Commission (2017), *Building a European Data Economy*, COM(2017) 9 final, 10.1.2017, available at: https://ec.europa.eu/digital-single-market/en/news/communication-building-european-data-economy
[48] European Commission (2017), *Staff Working Document on the free flow of data and emerging issues of the European data economy*, SWD(2017) 2 final, 10.1.2017, available at: https://ec.europa.eu/digital-single-market/en/news/staff-working-document-free-flow-data-and-emerging-issues-european-data-economy

most cases, data are kept inside the company and further re-use does not take place.[49] This would limit the ability of businesses to benefit from external data sources. To address this problem, a set of policy objectives were laid down (see figure below), including the improvement of access to anonymous machine-generated data, measures to encourage data sharing, protection of corporate investments and assets, protection of confidential data in a context of economic competition, and the minimisation of lock-in effects, especially for SMEs and start-ups. The Communication also discusses other related emerging issues linked to data such as liability, portability, interoperability and standardisation. For instance, addressing liability obligations of both users and manufacturers of data-generating devices is highlighted as crucial by the Commission in order to support more data sharing and re-use.
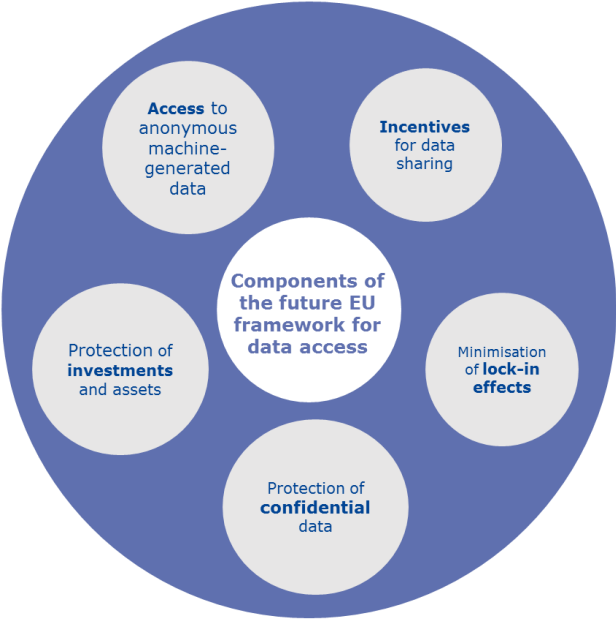
Figure 5. Components of the future EU framework for data access

Also in its Communication on 'Building a European data economy', the Commission stated its intention to engage in an extensive stakeholder dialogue and steadily continue pushing the agenda regarding data sharing and re-use in B2B contexts. In this spirit, a **public consultation**[50] was launched in early 2017. The consultation was open to businesses, consumers, data brokers, public authorities, research organisations, and other stakeholders from all economic sectors. The consultation was aimed, among others, at assessing the extent to which non-personal, machine-generated data are actually exchanged in Europe, identifying the nature of barriers that hinder data sharing and re-use, and collecting views on ways to tackle them. The survey gathered 380

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[49] Deloitte, Impact Assessment support study on emerging issues of data ownership, interoperability, (re)usability and access to data, and liability, study report (forthcoming); preliminary results reported in: Staff Working Document accompanying the Communication "Building a European Data Economy", pp. 15-16.
[50] European Commission (2017), *Public consultation on Building the European Data Economy*, available at: https://ec.europa.eu/digital-single-market/en/news/public-consultation-building-european-data-economy

responses, out of which 332 were from businesses or organisations[51]. The insights collected through the public consultation provided a better picture of the demand and supply side of data sharing in the EU. According to the detailed analysis of the public consultation results[52], companies appear to engage significantly in data sharing. More than half of respondents indicate some form of dependence on data produced by others. Three quarters of respondents share their data to some extent. Most pass on data only inside the same economic group or to a subcontractor. Roughly a third share data more widely, either on the basis of relatively open reuse conditions or against payment of a licence fee. In addition, the public consultation also provided evidence that businesses or organisations experienced obstacles when accessing data from others. These obstacles encompassed, by order of importance, the denial of access to data, unfair terms and conditions, as well as prohibitive prices for acquiring the data.

Also in 2017, the **Mid-term Review on the implementation of the Digital Single Market Strategy**[53] pointed to the persisting need to fully digitise the European service sectors, explicitly mentioning health and care, energy, and transport as crucial sectors, and called for further investments in digital skills and infrastructure in order for businesses to make full use of cloud computing and Big Data solutions. It reiterated the necessity to guarantee a fair, stable, and trusted environment to catalyse data sharing and re-use by businesses. The mid-term review furthermore confirmed that whereas harmonised rules exist on personal data, access to and re-use of non-personal data in a business-to-business context are still dealt with on an individual contractual basis by companies and that the Commission will therefore continue assessing which legal initiatives are needed.

3.1.2. Existing legislation relevant for B2B data sharing and re-use at the EEA level

The main piece of legislation in the field of data protection is the **General Data Protection Regulation (GDPR)**[54], which entered into force in May 2016 and will be applicable to the EEA countries[55] from 25 May 2018. This Regulation seeks to harmonise the existing national laws through one common set of rules, replacing the former

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[51] Respondents to the public consultation were split into three different categories: businesses/organisations, self-employed individuals and citizens. The first category merged companies and organisations. Therefore, it is not possible to report the findings about companies alone.

[52] European Commission (2017), Synopsis report Consultation on the 'Building a European Data Economy' initiative; see also the "Annex to the Synopsis report: Detailed analysis of the public online consultation results on Building a European Data Economy", 7.9.2017, available at: http://ec.europa.eu/information_society/newsroom/image/document/2017-36/annex_to_the_synopsis_report_-_data_economy_A45A375F-ADFF-3778-E8DD2021E5CC883B_46670.pdf

[53] European Commission (2017), *Mid-term Review on the implementation of the Digital Single Market Strategy: A Connected Digital Single Market for* All, COM(2017) 228 final, 10.5.2017, available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1496330315823&uri=CELEX:52017DC0228

[54] Regulation (EU) 2016/679 of 27 April 2016 of the European Parliament and of the Council on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), *Official Journal of the European Union*, L 119/1, 4.5.2016, available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016R0679&from=en

[55] The GDPR was still under scrutiny by EEA/EFTA by February 2018. For more information about the legal status of this regulation, see: http://www.efta.int/eea-lex/32016R0679

Directive 95/46/EC[56]. It is a key instrument to reinforce individuals' fundamental right to the protection of their *personal data* in the digital age and to build citizens' trust with regard to the use and disclosure of their personal data, while supporting at the same time the free movement of such type of data in a secure manner in the EU. In the GDPR, 'personal data' is to be understood in a broad way as *"any information relating to an identified or identifiable natural person"*[57]. This encompasses a basic identifier like a name, but also location data, online identifiers or factors specific to the physical, genetic, economic, cultural or social identity of a person. As such, this Regulation covers data allowing for the identification of an individual, regardless of the mechanisms used for its collection, and whether they are automated or not. The Regulation also makes it easier for individuals to access their data and to receive information about how their data are being processed. As a major advancement for businesses, a one-stop-shop system is established in cases of cross-border data processing whereby businesses will only have to deal with one lead supervisory authority, not 28. The key novelties of the new EU rules on personal data protection are portrayed in the figure below.

Figure 6. Key novelties of the new EU rules on personal data protection

Another part of the EU data protection framework is the so-called **e-Privacy Directive**, which is currently under review[58]. This Directive aims at ensuring a high level of privacy protection for users of electronic communications services. In January 2017, the European Commission proposed a Regulation that will replace the existing Directive to adapt it to the technological developments occurred since it was approved and to align it with the new rules on personal data protection. A key novelty of the proposed Regulation is its broader material scope as it will apply to new players in electronic communications

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[56] Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data, *Official Journal of the European Union*, L 281/131, 23.11.95, available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31995L0046&from=en

[57] As outlined in Article 4(1) of Regulation (EU) 2016/679.

[58] European Commission (2017), *Proposal for a Regulation concerning the respect for private life and the protection of personal data in electronic communications and repealing Directive 2002/58/EC (Regulation on Privacy and Electronic Communications)*, COM(2017) 10 final, 10.01.2017, available at: https://ec.europa.eu/digital-single-market/en/news/proposal-regulation-privacy-and-electronic-communications

(e.g. WhatsApp, Facebook Messenger, Skype, Gmail, etc.) in addition to telecom operators. The Regulation will also cover content and metadata derived from electronic communications, which will be both subject to high privacy standards, and their processing will therefore require the data subject's consent. Once private individuals have given their consent, telecom operators may enjoy more opportunities to use data and provide additional services.

Finally, the **Database Directive**[59] stipulates that creators of databases possess the right to control access and re-use their contents, but only under the condition that the creation of the database involved a significant degree of investment. From May to August 2017, the Commission launched a **public consultation**[60] to evaluate the Directive's impact on users, its functionality, and possible ways to adjust it. The preliminary results of this public consultation were disclosed in October 2017[61]. The consultation received a total of 113 replies, of which 18 came from businesses. Based on the responses received, a majority of respondents consider that the original objectives of the Directive are still valid today, although there is not a unified opinion on the degree to which the Directive has managed to achieve them. A majority of respondents also believe that the *sui generis right* established by the Directive sufficiently protects investments made in the creation and maintenance of databases, but opinions are divided as to whether the current scope of this right is comprehensive enough nowadays. There is also a divergence of opinions regarding the ability of the Directive to achieve an adequate balance between the rights and interests of database owners and users, and there is neither a consensus on what approach should prevail.

3.1.3. Sector-specific policy and legal initiatives

In light of the aim to create a Digital Single Market, a range of sector-specific policy and legal initiatives relevant for data sharing and re-use between European companies are briefly discussed below.

3.1.3.1. Data-generating driving

The Commission has been very actively pushing the agenda on data sharing and re-use in the sector of data-generating driving.

In 2007, **access to vehicle repair and maintenance information (RMI)** was regulated so as to ensure free competition in the vehicle aftermarket. According to Chapter III of the Regulation (EC) No. 715/2007, which applies throughout the EEA, unrestricted and standardised access to vehicle repair and maintenance information

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[59] Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases, *Official Journal of the European Union*, L 77/20, 23.3.1996, available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A31996L0009
[60] More information about this consultation can be found here: https://ec.europa.eu/info/consultations/public-consultation-database-directive-application-and-impact-0_en
[61] European Commission (2017), *Summary report of the public consultation on the evaluation of Directive 96/9/EC on the legal protection of databases*, available at: https://ec.europa.eu/digital-single-market/en/news/summary-report-public-consultation-legal-protection-databases

should be provided by vehicle manufacturers (original equipment manufacturers – OEMs) to independent operators[62]. RMI should be accessed through websites using a standardised format. The RMI include, for instance, an unequivocal vehicle identification, technical manuals, component and diagnosis information, diagnostic trouble codes, the software calibration identification number applicable to a vehicle type, or data record information and two-directional monitoring and test data. Reasonable and proportionate fees may be asked by manufacturers for accessing RMI. Following Article 9 of this Regulation, the Commission published in 2016 a **report**[63] on the operation of the system of access to vehicle repair and maintenance information. This report concluded that the Regulation has generally contributed to improving access to RMI in during the last years. Nevertheless, obstacles still exist which impact negatively on the competition between authorised and independent repairers. Changes and improvements to enhance the operation of the system of access to vehicle RMI have been suggested in this report which will be considered by the Commission.

Access to road safety-related data (including data generated by vehicles) has been addressed in the Delegated Regulation (EU) No 886/2013 supplementing the Directive 2010/40/EU. Data and procedures for the provision, where possible, of road safety-related minimum universal traffic information should be done free of charge. Service providers (including vehicle manufacturers if they provide such services) shall share and exchange the data they collect through an access point.

In addition, a broader issue has been discussed in the context of the **C-ITS platform**. More concretely, the access to in-vehicle data, including for the automation of cars, as well as the possibility for enabling new types of services building on top of such data, have been considered. A **report**[64] recently submitted by the C-ITS Platform[65] highlights, for instance, the importance of lowering barriers to entry in terms of access to in-vehicle data in order to allow for the deployment of new services and applications. The report also makes concrete suggestions about the principles that should apply when granting access to in-vehicle data, which are: prior consent of the data subject (owner of the vehicle); fair and undistorted competition among all service providers; data privacy and data protection of vehicle and movement data; secure access not altering the functioning of the vehicles and not impacting the liability of vehicle manufacturers regarding the use of the vehicle; and standardised access favouring interoperability between applications.

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[62] According to the Regulation (EC) No. 715/2007, an independent operator is defined as *"undertakings other than authorised dealers and repairers which are directly or indirectly involved in the repair and maintenance of motor vehicles, in particular repairers, manufacturers or distributors of repair equipment, tools or spare parts, publishers of technical information, automobile clubs, roadside assistance operators, operators offering inspection and testing services, operators offering training for installers, manufacturers and repairers of equipment for alternative fuel vehicles"*.
[63] European Commission (2016), Report from the Commission to the European Parliament and the Council on the operation of the system of access to vehicle repair and maintenance information established by Regulation (EC) No 715/2007 on type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information, COM(2016) 782 final, 9.12.2016, available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52016DC0782&from=EN
[64] C-ITS Platform (2016), Final report, January 2016, available at: https://ec.europa.eu/transport/sites/transport/files/themes/its/doc/c-its-platform-final-report-january-2016.pdf
[65] More information can be found at: https://ec.europa.eu/transport/themes/its/c-its_en

3.1.3.2.   Smart agriculture

The Commission has recently engaged in debating the specificities of B2B data sharing in the agricultural sector. In April 2017, a **workshop**[66] was organised to discuss data governance models[67] and their respective benefits and obstacles for farmers, define principles and best practices on sharing and re-using data in agriculture. Participants concluded that the purpose and the expected beneficiaries of shared data should be the two main elements determining whether data may or may not be shared in a specific case. In principle, it should be the data supplier who exercises the right to (not) grant access to data. Furthermore, a list of do's and don'ts was compiled to guide the future policy debate. Finally, there was a clear request to the Commission to prepare a regulatory framework for data sharing in the sector, to be accompanied by a more detailed stakeholder examination through established channels (e.g. EIP-AGRI). The creation of pre-competitive data sharing spaces and infrastructures open to all stakeholders was proposed in this context, which may potentially be relevant to other business sectors.

In the end of 2017, the Commission released a **Communication on the Future of Food and Farming**[68]. This Communication sets out the main objectives of the future European common agricultural policy (CAP), including fostering a smart and resilient agricultural sector through technological development and digitisation. More specifically, the Communication details some of the benefits of smart agriculture, including the access to data which allow farmers to make better and faster decisions, plan or predict future crop yields, or to optimise the production.

3.1.3.3.   Smart manufacturing

In April 2016, the Commission published the **Communication on Digitising European Industry**[69], accompanied by the **Staff Working Document Advancing the Internet of Things in Europe**[70]. These documents specifically address the topic of "ownership" and use of data generated in the context of industrial manufacturing. The Commission announced its intention to explore legal frameworks for autonomous systems and IoT applications, while also addressing the role of apps and software not covered by sectorial

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[66] EIP-AGRI, *EIP-AGRI Workshop – Data sharing: ensuring fair sharing of digitisation benefits in agriculture*, July 2017, available at: https://ec.europa.eu/eip/agriculture/sites/agri-eip/files/eip-agri_workshop_data_sharing_final_report_2017_en.pdf

[67] Examples of data sharing governance models are the DATA-FAIR Governance Guidelines, the Open Data Institute's Data Spectrum, the FAIR principles, the Tim Berners-Lee 5 Star Scheme, or the Creative Commons licenses.

[68] European Commission (2017), *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – The Future of Food and Farming*, 29.11.2017, COM(2017) 713 final, available at: https://ec.europa.eu/agriculture/sites/agriculture/files/future-of-cap/future_of_food_and_farming_communication_en.pdf

[69] European Commission (2016), *Digitising European Industry – Reaping the full benefits of a Digital Single Market*, COM(2016) 180 final, 19.4.2016, available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52016DC0180&from=EN

[70] European Commission (2016), *Staff Working Document on Advancing the Internet of Things in Europe*, SWD(2016) 110 final, 19.42016, available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52016SC0110&from=DA

legislation so far. Moreover, the **European Cloud Initiative**[71] will make it easier to exploit the benefits of Big Data by making data sharing and re-use easier for manufacturers.

3.1.3.4. Telecom operators

The EU has recently been very active in enhancing competitiveness and making infrastructure investments more attractive in the telecommunications sector. For instance, in 2015, the Commission launched **public consultations** on businesses' requirements for internet speed and quality[72] and on the existing regulatory framework for electronic communications networks and services[73]. These initiatives will help establish the necessary preconditions for B2B sharing and re-use of data in this sector. A **proposal for a Directive establishing the European Electronic Communications Code** was issued in October 2016 building on the findings of the public consultations[74]. The aim of this proposal is to adapt the current regulatory framework for electronic communications to the present needs, taking into account the new players that have entered the market (and are now competing with traditional telecom operators), as well as the increasing importance and demand for connectivity services. Another key ongoing review with significant implications for the telecom sector is the reform of the **ePrivacy legislation**[75]. The proposed Regulation takes into account the new players that provide electronic communications services (such as WhatsApp, Facebook Messenger or Skype), it lays down stronger standards in terms of level of protection and privacy, simpler rules on the use of cookies, and facilitates a more effective enforcement of the confidentiality norms through the data protection authorities at national level.

3.1.3.5. Smart living environments

The Commission has actively pushed the agenda in relation to fostering the sharing and re-use of data by companies operating in the field of smart living environments. In 2015, in close cooperation with the industry and the European Telecommunications Standards Institute, the Commission developed a European standard for smart appliances, the **Smart Appliances REFerence ontology** (SAREF)[76]. SAREF enables home devices to

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[71] European Commission (2016), *European Cloud Initiative – Building a competitive data and knowledge economy in Europe*, COM(2016) 178 final, 19.4.2016, available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52016DC0178&from=EN

[72] European Commission, *Public consultation on the needs for Internet speed and quality beyond 2020*, 11.9-7.12.2015, available at: https://ec.europa.eu/digital-single-market/en/news/public-consultation-needs-internet-speed-and-quality-beyond-2020

[73] European Commission, *Public consultation on the evaluation and the review of the regulatory framework for electronic communications networks and* services, 11.09-7.12.2015, available at: https://ec.europa.eu/digital-single-market/en/news/public-consultation-evaluation-and-review-regulatory-framework-electronic-communications

[74] European Commission (2016), *Proposal for a Directive establishing the European Electronic Communications Code*, COM(2016) 590 final/2, 12.10.2016, available at: http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=comnat:COM_2016_0590_FIN

[75] European Commission (2017), *Proposal for a Regulation of the European Parliament and the Council concerning the respect for private life and the protection of personal data in electronic communications and repealing Directive 2002/58/EC (Regulation on Privacy and Electronic Communications*, (COM(2017) 10 final, 10.1.2017, available at: https://ec.europa.eu/digital-single-market/en/news/proposal-regulation-privacy-and-electronic-communications

[76] European Commission (2015), "New standard for smart appliances in the smart home", Blogpost, 1.12.2015, available at: https://ec.europa.eu/digital-single-market/en/blog/new-standard-smart-appliances-smart-home

communicate in a standardised language, thereby making data exchange by companies more feasible. Moreover, the Commission launched a **public consultation**[77] on developing standards for the digital single market. Its results served to build an **ICT Priority Standards Plan**[78], catalysing the ability of companies to collect and ultimately share and re-use data.

3.1.3.6. Smart grids and meters

In 2017, the Commission stressed that to ensure market functioning, efficiency and profitability in the energy sector it is essential to enable access to relevant non-personal or anonymised data[79]. Smart metering creates enormous amounts of data which, if shared and re-used, can create substantial efficiency and competitiveness gains for companies. There is clear awareness of the importance of facilitating data sharing in the sector, as already outlined in the **Internal Electricity Market Directive**[80] and currently being put forward in the proposed recast Directive[81]. This Directive calls on Member States to organise the management of data so as to ensure efficient data access and exchange, and agree on a common data format and a transparent procedure for this purpose (Articles 23 and 24). In 2009, the Commission also established the **Smart Grids Task Force**[82] consisting of five expert groups regularly advising the Commission on issues related to smart grid deployment and development.

3.2. Existing studies on data sharing and re-use between companies

Over the past few years the European Commission has supported a number of studies to improve its knowledge about the dimension, the value and the level of maturity of the European data economy, as well as to understand the barriers that exist. These findings should support the EU's vision and strategy on data, as well as the policy and/or legislative measures that are being put forward. The key findings of these studies which are relevant for the purposes of this study are summarised below. The aim of this review is to ensure that the present study departs from and builds on previous research findings, and to be able to put them into relation with the data collected as part of the study's fieldwork.

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[77]European Commission (2015), *Public consultation on the Priority ICT Standards Plan* (open from 23.09.2015 to 4.01.2016), available at: https://ec.europa.eu/digital-single-market/en/news/public-consultation-priority-ict-standards-plan

[78] European Commission (2016), *ICT Standardisation Priorities for the Digital Single* Market, COM(2016) 176 final, 19.4.2016, available at: http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=15265

[79] European Commission (2017), *Staff Working Document on the free flow of data and emerging issues of the European data economy*, SWD(2017) 2 final, 10.01.2017, available at: http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=41247

[80] Directive 2009/72/EC of the European Parliament and of the Council of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC, *Official Journal of the European Union*, L211/55, available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0072&from=EN

[81] European Commission (2016), *Proposal for a Directive on common rules for the internal market in electricity* (recast), COM(2016) 864 final, 30.11.2016, available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2016:0864:FIN

[82] For more information see: http://ec.europa.eu/energy/en/topics/markets-and-consumers/smart-grids-and-meters/smart-grids-task-force

The angle and approach to data that each of these studies take are different. As such, their findings are presented separately in distinct subsections. Some of these studies attempt to make a quantitative assessment of the value of data in the EU or the uptake and benefits of cloud computing, while others focus on the barriers to data sharing and/or re-use, or on the emergence of new actors in the data value chain from a more qualitative perspective. Some of them take a general, cross-sectorial approach, while others focus on a limited number of sectors or on a particular sector in particular. The last section on concluding remarks seeks to gather the most relevant findings and to draw some conclusions for the purposes of this study.

3.2.1.   The EU Data Market is worth EUR 60 Billion

According to a study about the **European Data Market**[83], *"where digital data are exchanged as products or services as a result of the elaboration of raw data"* (p. 110), the value of the data market **was estimated to be EUR 59.5 billion worth in 2016** in the EU28, with an annual growth rate of 9.5 %. This study also indicated that the EU Data Market could potentially reach EUR 106.8 billion by 2020 (pp. 110-111).

The value of the EU Data Economy, which encompasses the *"aggregate value of the demand of digital data (i.e. the EU Data Market) plus the direct, indirect and induced impacts of data in the economy as a whole"* (p. 25) was estimated at almost **EUR 300 billion in 2016 in the EU28, with a forecasted value of EUR 739 billion by 2020** if the right policy and legal conditions were put in place (p. 126). By indirect impacts the study considers the economic impacts that take place in industries other than the data industry itself, including the economic benefits that the exploitation of data can provide to user industries in terms of innovation to their production and delivery processes, to their marketing strategies, or to their management practices.

To define and measure the European Data Economy, the study relies on a number of key indicators[84], including amongst others: the number of data companies (i.e. data suppliers) and their revenues, the number of data users and their average data spending, as well as the incidence of the Data Economy on GDP.

The number of **data companies**, understood as *"data suppliers' organisations whose main activity is the production and delivery of digital data-related products, services and technologies"* (p. 73), therefore representing the supply side of the data market, were estimated at almost 255 000 in the EU28 in 2016. Most of these data companies are heavily concentrated in the UK, in Germany and in Italy, which host alone almost two thirds of all data companies in the EU in the period going from 2013-2016. Sector-wise, a majority of these data companies are concentrated in the ICT sector (p. 88).

The number of **data user companies**, defined as organisations that *"generate, exploit, collect and analyse digital data intensively and use what they learn to improve their business"* (p. 73), therefore representing the demand side of the data market were estimated at 661 000 in the EU28 in 2016, showing a 1.6 % annual growth, but still

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[83] IDC and Open Evidence (2017), European Data Market Study, Final Report (SMART 2013/0063), available at: https://ec.europa.eu/digital-single-market/en/news/final-results-european-data-market-study-measuring-size-and-trends-eu-data-economy

[84] See, particularly, pp. 123-124

accounting for only 6.4 % of the potential user companies in the EU (pp. 90-91). As opposed to data companies, that were heavily concentrated in three Member States, data users were found to be more evenly spread across the EU, although the UK, Germany, Italy and Spain host alone almost two thirds of the total number of European data user companies (p. 90). When looking at the figures from a relative perspective (i.e. number of data user companies out of potential companies at country level), the Netherlands, the UK, Ireland and Luxembourg were found to be the leaders with a percentage share of user companies between 9 % and 12 % of the their total amount of companies (p. 91). By sector, most data users were concentrated in professional services, manufacturing, wholesale and retail and transport (p. 91). As regards the company size, small and medium enterprises (SMEs, i.e. companies with up to 249 employees) account for 98.9 % of data users in the EU (p. 93).

Figure 7. Data companies and data user companies in the EU28 in 2016

The study also provides some insights into **data monetisation**, i.e. the economic value of data. Data companies are estimated to have made an **overall revenue of approximately EUR 62 billion** in 2016, up from EUR 56 billion in 2015 and from EUR 51 billion in 2014 (p. 101). Per company size, small companies with 1 to 49 employees are expected to have captured 55 % of these revenues in 2016, making an average annual data revenue of EUR 149 000, followed by companies of 250 to 499 employees (concentrating 25 % of the data revenues, with average data revenues of EUR 5.6 million per year), and by companies with 50 to 249 employees (18 %, with average data revenues of EUR 438 000 euros, pp. 105-106). Large companies with 500 employees and more account for 2.4 % of total data revenues in 2016, with average revenues of EUR 17 million per company.
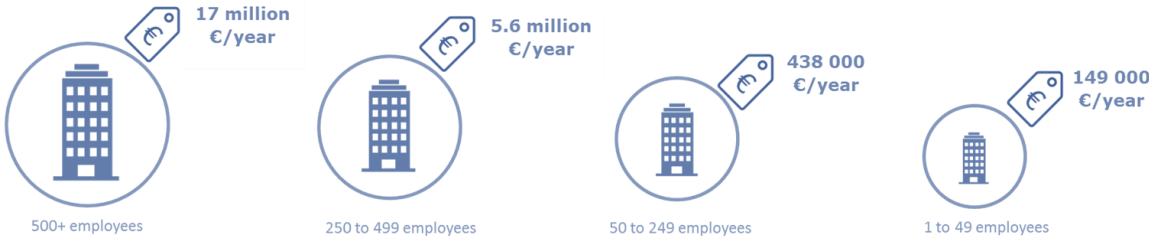

Figure 8. Average annual data revenues per company size

In terms of **data spending**, SMEs are expected to have spent on average EUR 27 000 in 2016 to be able to access and use datasets for their business purposes, while larger companies are expected to have spent on average over EUR 6 million (p. 94).

Finally, in terms of impact on the data economy on EU's GDP, the study estimates an incidence of 1.99 % in 2016, which could go up to 4 % by 2020 according to the most optimistic forecasts (p. 126).

3.2.2. The emergence of data marketplaces as new actors in the European data value chain

As part of the study mentioned above[85], the state of the art of data marketplaces in Europe was also analysed taking particularly into account their specificities in terms of activities and business models that differentiate them from other data companies. In this study, data marketplaces are presented as cloud-based software platforms that act as market intermediaries in the transactions between data holders and data users, and offering a range of services that may include data storage, aggregation and exchange to ensuring the interoperability of datasets, data enrichment or analysis, to facilitating the development of services and apps based on the data they manage (p. 10). The study portrays data marketplaces as an emerging phenomenon in Europe, with a reported 3 % to 3.5 % self-defined data marketplaces of the more than 450 actors mapped in the European data landscape community. This mapping was part of the European Data Market study previously referred to (p. 26). While this represents still a low share, the study forecasts a rapid growing market opportunity for companies providing this type of services in the next few years (p. 26), with current annual revenues ranging from EUR 1 to 3 million or EUR 200 million and more depending on their size and the type of services that they provide (p. 8).

3.2.3. Key obstacles to B2B data sharing and re-use: legal uncertainties, lack of data skills, estimation of the value of data, interoperability and high access costs

A forthcoming study[86] on the barriers faced by companies willing to share or access data from third parties assessed the relative importance of the problems or obstacles faced when sharing or re-using data depending on the sector, on the company's size and market power, and on the position of the companies on the data value chain, either as data suppliers or as data users (p. 27).

For SMEs, for instance, that are found to be generally less active in data sharing than large companies, the most important barriers to sharing data are: legal uncertainties surrounding *"ownership rights"* over data, their usage and associated liabilities; lack of knowledge and skills to be able to maximise the use of data and to implement effective

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[85] IDC and Open Evidence (2016), *Europe's Data Marketplaces – Current Status and Future Perspectives* (SMART 2013/0063 D 3.9), available at: http://datalandscape.eu/data-driven-stories/europe%E2%80%99s-data-marketplaces-%E2%80%93-current-status-and-future-perspectives
[86] Deloitte and Openforum Europe (2017), Impact Assessment support study on emerging issues of data ownership, interoperability, (re)usability and access to data, and liability, fourth interim report (unpublished manuscript)

strategies on how to make the best use of them, and difficulties in putting a value to data and claiming a price for it (p. 31). For SMEs interested in accessing data from others, legal uncertainties are also a barrier, together with interoperability issues, the high costs of accessing relevant data and the unequal bargaining power (pp. 31-32).

Per sector, technical barriers (including interoperability issues) are found to be of particular importance for the energy sector and for agriculture, and to a lesser extent also for the automotive sector, or telecoms and for mobile health (p. 33). Legal barriers are referred to as a challenge particularly faced in the energy sector, but also for the agricultural and the telecoms sectors to a lesser extent.

When not accounting for sectors or company sizes, the risk of sharing sensitive commercial data with third parties, uncertainty about "ownership" and usage of the data and interoperability issues stand out as very important barriers that may even become a blocking factor to data sharing (p. 40).

The obstacles described above largely correspond to the main barriers identified in the European Data Market study[87]. In this study, three main barriers are described:

- **Cultural/organisational barriers**, including lack of awareness of potential business benefits of data sharing, lack of trust and fear to lose a competitive advantage, difficulty to assess the value of data assets, etc.

- **Legal/regulatory factors**, including uncertainty on "data ownership" and access to data and unjustified restrictions to data location and the free flow of data

- **Technical/operational barriers** due to a lack of interoperability between different datasets and information systems, lack of (compatible) standards, high costs linked to data curation, etc.

The **complexity of the concept of "data ownership"** and the absence of a legal framework at EU level that duly protects 'property-type rights' over data and enables control over their usage are also highlighted in a different study[88] as factors that discourage businesses from giving access to data to third parties. Indeed, this study suggests that "data ownership" and access find themselves in a grey zone that is neither satisfactorily covered by the EU Trade Secrets Directive, Intellectual Property laws, the Database Directive or competition law (p. 9-11). The need for action at EU level on "data ownership" rights was also highlighted in a recent study[89] on legal issues of digitalisation in Europe.

With regard to the technical barriers, the analysis by IDC and Open Evidence[90] reveals that this type of barriers is only perceived when companies start dealing with data sharing in practice and particularly in the context of projects involving collaboration with

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[87] IDC and Open Evidence (2017), "Technical barriers to data sharing in Europe", European Data Market Study (SMART 2013/0063), p. 7, available at: http://datalandscape.eu/data-driven-stories/what-limits-data-sharing-europe

[88] Osborne Clarke LLP (2016), Legal study on Ownership and Access to Data, Final report (SMART 2016/0085), available at: https://publications.europa.eu/en/publication-detail/-/publication/d0bec895-b603-11e6-9e3c-01aa75ed71a1/language-en

[89] Business Europe and Noerr (2017), Legal issues of digitalisation in Europe, available at: https://www.businesseurope.eu/sites/buseur/files/media/reports_and_studies/2017-09-29_legal_issues_of_digitalisation_in_europe.pdf

[90] IDC and Open Evidence, "Technical Barriers to Data Sharing in Europe", op.cit., p. 21.

other enterprises. The main issue within the technical barriers is the **lack of interoperability among different systems** that prevent the integration and the exploitation of value from data (p. 21). While specific industry standards and architecture standards are being developed to support data sharing, a balance needs to be found between standardisation and innovation/customisation to avoid narrow standards that result in excessive rigidity ultimately hindering innovation (p. 22). The increasing usage of APIs and SDKs are highlighted as positive steps towards easier data sharing (p. 21).

A further technical barrier of data sharing is the human work involved in **data curation**, i.e. the tasks related to the preparation of data for interoperability and sharing. This effort is sometimes underestimated and yet it takes more than 50 % of the time of data scientists in data sharing projects. Nonetheless, this task is expected to become increasingly automatised in the next years thanks to machine-learning technologies (p. 22).

3.2.4. Further barriers to data sharing in the EU: data localisation restrictions

Forced localisation of data is found to be an important legal obstacle to data re-use in business-to-business relations in a recent study on legal issues of digitalisation in Europe[91].

Another study on cross-border data flow in Europe[92] goes deeper into data localisation measures in the EU and examines the prevalence of restrictions to the free flow of data through desk research and consultations with businesses across a group of eight Member States[93]. According to this study**,** formal restrictions, whether in the form of legislation or in other lower-level regulations, are in practice a minor problem to intra-EU data transfers compared with **misperceptions about the rules in place**. Indeed, a key finding of this piece of research is the widespread misinterpretation among market participants of the existing legal framework for cross-border data flows. Many businesses seem to believe that legislation in force mandates data storage and processing to be done within national borders where in fact this is not the case (p. 38). There also appears to be a tendency to consider one's own country as automatically safer for data storage and processing, and a general risk aversion when dealing with data. Indeed, the study concludes that location is often seen by market participants as a proxy for security in terms of access, privacy, data integrity or law enforcement, even though local data storage does not per se improve technical security (p. 38). Formal legal restrictions in terms of data localisation are rarely found and absolute prohibitions are limited to areas of core national interest such as security and defence. Substantial evidence is found, on the contrary, of internal company policies that apply strict data residency requirements that are not based on any legislation in place (p. 37).

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[91] Business Europe and Noerr, op.cit., p. 14.
[92] London Economics, Carsa and CharlesRussel Speechlys (2016), Facilitating cross border data flow in the Digital Single Market, Final report, available at: https://ec.europa.eu/digital-single-market/en/news/facilitating-cross-border-data-flow-digital-single-market-study-data-location-restrictions
[93] Czech Republic, France, Germany, Italy, Lithuania, Luxembourg, Spain and the United Kingdom.

Another ongoing study[94] looks also into data localisation restrictions in the EU, but specifically focuses on regulatory barriers, whether direct or indirect. Among the **direct regulatory barriers** (namely a legal text stating that data must be stored in a particular location or may not be transferred), the study identifies two main type of barriers: geographic location storage requirements (i.e. stating that a storage facilities must be located in a particular country) and unique national technical requirements (i.e. nationally defined requirements with regard to the format in which data must be provided). Among the **indirect regulatory barriers** (namely when a law contains requirements that may be interpreted as restricting data flows), the study identified different types of obstacles, including: prior authorisation schemes, accessibility to supervisors, subcontractor restrictions, destruction requirements, mandatory use of a specific infrastructure or prohibitions against third party access or disclosure (p. 5).

3.2.5. Sectorial studies on B2B data sharing

The subsection below collates and examines a few studies on data sharing that are specific for some of the sectors targeted in this study. The aim of this literature review is once more to build on existing research as a departure point for this study. As an innovation-savvy sector, the value of data is already well-appreciated by the automotive industry. Other sectors where access to data is increasingly important are agriculture and energy markets. Data further opens up opportunities for smart living environments.

3.2.5.1. Data-generating driving

As a forerunner sector in terms of technology and innovation, the automotive industry has been exploring for some years already the potential of using the ever larger quantities of in-vehicle generated data to provide benefits for drivers, passengers and other road users. A study on the deployment of Cooperative Intelligent Transport Systems (C-ITS) in Europe[95] explains that a car generates different categories of data that can enable a wide range of use cases, ranging from traffic management, emergency calls, repair and maintenance services, remote diagnostics and breakdown prediction, driver coaching, real driving consumption, risk assessment of drivers' behaviour or real-time location-based services. This study identified five services relying on in-vehicle data that can yield societal benefits through important savings (p. 94). Probe vehicle data services[96] could, for instance, improve road safety and prevent road fatalities and injuries in Europe, helping to save approximately EUR 170 million in 2017 and up to EUR 900 million in 2030 (p. 95). A Traffic Jam Warning Service could save about EUR 145 million in 2017 and up to EUR 800 million in 2030 by reducing the number of road fatalities and injuries in Europe. Other examples of such services are an Emergency Brake Light helping to avoid rear end collisions or a Slow Vehicle Warning allowing drivers to gradually adjust their driving or opting for an alternative route. All of these services are

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[94] Spark, Timelex and tech4i2 (n.d.), *Cross-border data flow in the Digital Single Market: data location restrictions* (extracts from the ongoing study SMART 2015/0054), available at: http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=41209

[95] McCarthy, M., Seidl, M. et al. (2017), Access to In-vehicle Data and Resources, Final Report, pp. 30-31, available at: https://ec.europa.eu/transport/sites/transport/files/2017-05-access-to-in-vehicle-data-and-resources.pdf

[96] Probe vehicles consist of vehicles or devices placed in vehicles that are able to collect traffic data in real-time.

found to significantly contribute to improving road safety and reducing casualties and injuries. Other positive impacts include an improvement in fuel consumption and in CO2 emissions.

Another study[97] showed that customers are increasingly willing to share their driving data with their insurers in exchange for additional services, even if this implies switching more often between insurance providers (pp. 19-20). Examples of valued services for which customers are willing to share their data include: free roadside assistance, automatic emergency assistance, free parking, theft notification, remote vehicle diagnostics or information on free parking. Based on a sample of 15 000 customers from 11 countries[98] in Europe, this study estimates that by 2020 the market share for digitally-enabled motor insurance in Europe could reach 17 %, which would represent EUR 97 billion of additional revenues in these 11 countries alone (p.5).

3.2.5.2. Smart agriculture

The sector of agriculture is increasingly becoming data-driven. The OECD pointed out in a study dating from 2006 that the farmers' ability to access agricultural data *has become a determinant factor for failure and success"* [99]. The study already revealed back then that major providers of precision farming technologies, namely agriculture technology providers such as John Deere or Monsanto, had acknowledged this trend and started taking advantage of IoT by integrating sensors in their equipment to be able to generate and collect large volumes of datasets relevant to other companies in the sector.

The topic of data-driven innovation in the agricultural sector has been recently covered by different projects funded by the Directorate-General for Agriculture and Rural Development under the Horizon 2020 programme, such as Smart-AKIs[100] or 4D4F thematic networks[101]. Furthermore, this topic has been also addressed by the European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI), and more concretely through a seminar on emerging data-driven business models that took place in June 2016. Several business models were discussed at the seminar, including:

- Basic data sales, whereby the farmer pays for the software for collecting data or directly for the data

- Product innovation, whereby existing products (often machinery) become much more data-intensive

- Commodity swap, where data are exchanged between farmers and food manufacturers to increase the service component of the transaction

- Value chain integration, whereby data are used for a more efficient decision-making

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[97] Deloitte (2016), European Motor Insurance Study – The rise of digitally-enabled motor insurance, available at: https://www2.deloitte.com/content/dam/Deloitte/nl/Documents/financial-services/deloitte-nl-fsi-european-motor-insurance-study.pdf
[98] Austria, Belgium, France, Germany, Ireland, Italy, Netherlands, Poland, Spain, Switzerland and the United Kingdom
[99] OECD (2006), Maximising the economic and social value of data - Understanding the Benefits and Challenges of Enhanced Data Access, p. 20.
[100] More information about SMART-AKIS can be found at: https://www.smart-akis.com/
[101] More information about 4D4F can be found at: http://www.4d4f.eu/

- Value net creation, mainly through platforms linking different groups of clients and fostering their interaction.

Discussions also focused on limiting and encouraging factors for data-driven business models in this sector. Among the limiting factors, the following were highlighted: a lack of awareness of the possibilities and benefits of data-driven applications for agriculture, interoperability and standardisation issues, lack of incentives to farmers to share their data, or the governance of data and the potential impact of ICT on the food chain. Having appropriate legal frameworks for "data ownership" were identified as an important factor that could encourage data sharing.

Finally, a recent piece of research by the Wageningen University[102] also highlighted the potential of applying Big Data techniques to agriculture as a major added value to the agri-food sector. Key areas of change enabled by data are real-time forecasting, tracking of physical items and reinventing business processes (p. 73). The paper further looked into the push-pull factors that drive Big Data applications in smart farming. On the one hand, farmers are looking for ways to improve efficiency and profitability through lower costs and better prices for their products. This pushes them to take more optimal decisions and improve management control. At the same time, consumers are becoming more concerned about food safety and nutritional aspects of food with an impact on health, which calls for new technological solutions. On the other hand, the IoT is expected to lead to important changes in farm management due to the sudden access to data and information that was previously not available and that allows farmers to take better decisions.

3.2.5.3. Smart living environments

The benefits of data sharing are also acknowledged in the field of smart living environments and in smart assisted living in particular. A report by the Alliance for Internet of Things Innovation (AIOTI) calls for an integrated care framework that enables data sharing between medical, support personal and elderly people as a way to tap the potential offered by IoT technologies and extract the value from real-time data made available by them[103].

The collection, analysis and distribution of data is also acknowledged as a game changer in the field of smart living in the Business Innovation Observatory report 2014[104].

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[102] Wolfert, S., Ge, L., Verdouw, C. and Bogaardt, M-J. (2017), 'Big data in smart agriculture – a review', in *Science Direct*, available at: https://ac.els-cdn.com/S0308521X16303754/1-s2.0-S0308521X16303754-main.pdf?_tid=f61978f2-e3e9-11e7-a70d-00000aab0f6c&acdnat=1513598145_a5eaaf7f8995065e28273133f0f6c5dd

[103] AIOTI (2015), *Smart Living Environment for Ageing Well*, Report, p. 26, available at: https://aioti.eu/wp-content/uploads/2017/03/AIOTIWG05Report2015-Living-Environment-for-Ageing-Well.pdf

[104] Probst, L., Monfardini, E. et al. (2014), Smart Living: "Connected devices for intelligent homes" (case study 20), in Business Innovation Observatory, p. 7., available at: https://ec.europa.eu/docsroom/documents/13407/attachments/4/translations/en/renditions/native

3.2.5.4. Smart grids & meters

With smart meters being deployed across Europe as part of the EU's ambitious goal to equip at least 80 % of customers with smart meters by 2020[105], it is expected that the amount of data available on energy consumption will increase substantially. This trend will be amplified by the development of IoT devices, which further expand the possibilities for data collection. This phenomenon is leading to an evolution of the role of Distribution System Operators (DSOs), which will be managing increasing amounts of data in the coming years[106]. DSOs are responsible for operating, ensuring the maintenance and developing the electricity distribution system in a given area and for delivering the power to final customers. On the other hand, Transmission System Operators (TSO) are in charge of moving large blocks of power within a country or region or across countries, from the place where they are produced to there where they are consumed[107].

A report produced in 2016 by the Smart Grid Task Force ad hoc group[108] examined a series of initiatives on data access and data management in the field of energy distribution in 10 Member States[109]. The purpose of this revision was to identify obstacles and explore the potential for a common format for energy data interchange at EU level. Based on the national experiences analysed, the report identifies two main use cases for energy-related data: the 'download my data' use case, allowing customers to download their energy-related data, and the 'share my data' use case, allowing customers to share their energy-related data with other parties and to revoke at any time their consent to be able to access their data. Some solutions encompass both the 'download my data' and the 'share my data' functionalities (pp. 23-24). With the Member States already testing and developing their own mechanisms for providing energy data to their end clients, the report called for a common format for energy data interchange at EU level that can ensure interoperability of the solutions, thereby supporting the European internal market for future energy services.

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[105] European Commission (2011), Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: *Smart Grids: from innovation to deployment* COM(2011) 202 final {SEC(2011) 463 final}, 12.4.2011, p. 3, available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0202:FIN:EN:PDF

[106] European Distribution System Operators (EDSO) (2014), Data management: the role of Distribution System Operators in managing data, p. 5, available at: https://www.edsoforsmartgrids.eu/wp-content/uploads/public/EDSO-views-on-Data-Management-June-2014.pdf

[107] Eurelectric (2010), The role of Distribution System Operators as Information Hubs, p. 4, available at: http://www.eurelectric.org/media/44143/role_of_dsos_as_information_hubs_final_draft_10-06-10-2010-200-0001-01-e.pdf

[108] Smart Grids Task Force – Ad hoc group of the Expert Group 1: Standards and Interoperability (2016), "My Energy Data", available at: https://ec.europa.eu/energy/sites/ener/files/documents/report_final_eg1_my_energy_data_15_november_2016.pdf

[109] Belgium, Denmark, Estonia, Finland, France, Italy, Germany, Spain, the Netherlands and the United Kingdom.

4. Quantification of data sharing and re-use between companies in the European Economic Area

This chapter provides a complete analysis of the information and data collected through an online survey targeting companies all over the European Economic Area (EEA). The survey ran from mid-August until end-November 2017 and aimed at gathering crucial information to enable the quantification of data sharing and re-use in business-to-business relations, as well as the missed business opportunities resulting from the lack of access to relevant data from other companies. The results presented below should be interpreted with caution because they do not represent the whole universe of companies in the EEA.

The discussion of the findings from the responses collected through the survey are organised around four sections. First, an overview of the business socio-demographic information of the companies that participated in the survey is presented. Second, different dimensions concerning data sharing between companies in the EEA are closely examined. A similar analysis is provided for data re-use in B2B relations. Finally, the missed business opportunities resulting from the lack of access to data from other companies are estimated and discussed in detail.

4.1. Demographic distribution of the sample

Considering the objectives of this study, the timeline and resources available, the whole universe of companies in the EEA could not be surveyed. Therefore, a sample from the whole population was selected and surveyed in order to gather data that allowed for drawing conclusions about the whole population (more information about the sample can be found in annex 1).

One-hundred-and-twenty-nine (129) companies from 24 countries within the EEA, operating in the six selected business sectors and covering all four company sizes participated in the survey. The collection of responses to the survey proved challenging, partly due to the novelty of the topic. Given the limited sample, some of the results presented below need to be interpreted with care.

4.1.1. Geographical coverage

The survey targeted companies operating in the European Economic Area (28 EU Member States, Iceland, Liechtenstein and Norway). Considering the sample of 129 respondents, the country with highest participation in the survey was Spain (22), followed by Croatia (14), Germany (14), France (12) and Italy (10)[110]. The figure below shows the distribution per country of the 129 companies that participated in the survey.

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[110] Responses were also received from the following countries: Belgium (9), Austria (7), the Netherlands (5), Finland (4), Poland (4), the UK (4), Sweden (3), Estonia (2), Greece (2), Ireland (2), Lithuania (2), Norway (2), Portugal (2), Bulgaria (1), Denmark (1), Hungary (1), Iceland (1), Luxembourg (1) and Romania (1).

Figure 9. Number of responses by country

4.1.2. Company size

The company size is established based on the number of employees[111]. The distribution is quite balanced across all company sizes (ranging from 21 % for small-sized companies to 27 % for micro- and medium-sized companies). The figures below show the company size distribution of the 129 companies that participated in the survey.

Figure 10. Number of responses by company size

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[111] As a reminder, four company sizes were considered in this study following Eurostat's classification of 'enterprise size': large (250 or more employees), medium (50 to 249 employees), small (10 to 49 employees) and micro (less than 10 employees).
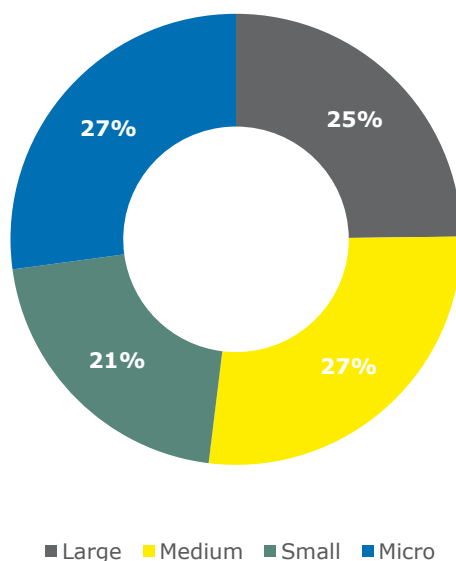
Figure 11. Percentage of responses by company size

4.1.3. Business sectors

The sectors with higher participation rates in the survey include smart manufacturing (24 %) and data-generating driving (23 %), followed by smart agriculture (16 %). Fewer answers were received from companies operating in the sectors of smart living environments (7 %), smart grids & meters (6 %) and telecom (4 %). Although the study targeted six specific business sectors[112], companies operating in other sectors also participated in the survey (20 %). The figures below show the distribution of survey respondents across the six selected business sectors.

Figure 12. Number of responses by business sector
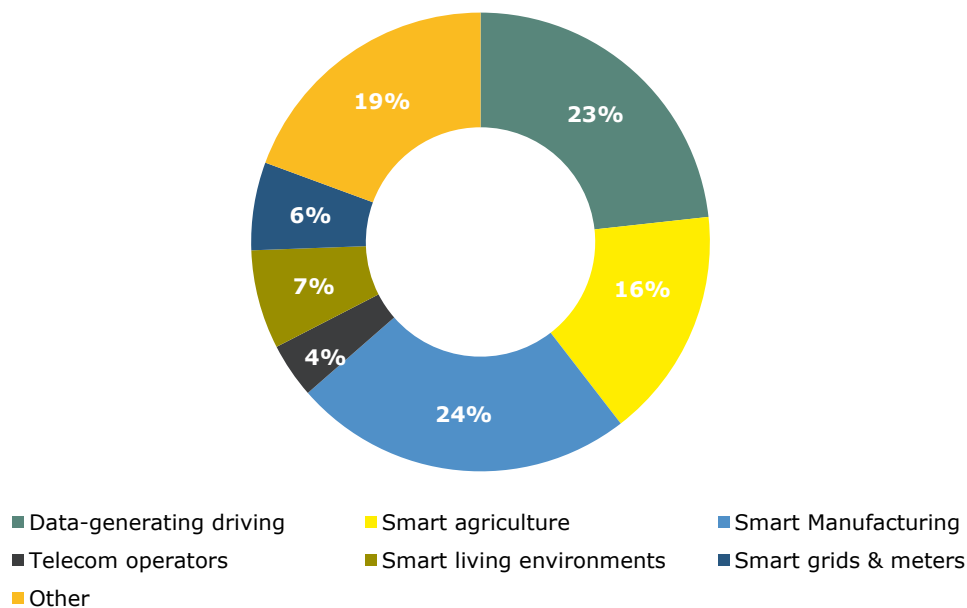
Figure 13. Percentage of respondents by business sector

4.2. Data sharing between companies in the EEA

This section attempts to quantify data sharing in B2B relations in the EEA. After ascertaining the percentage of companies that claim to share data (hereafter referred to as 'data suppliers') and describing their demographic attributes, a statistical analysis is made in relation to the reasons driving companies to share data among them, the type of data shared, preferred mechanisms to share data with other companies, the selected sectors to do so, the conditions to share data, as well as the income retrieved from this activity. Finally, this section also looks into the companies that currently do not share data among them, the reasons for not doing it, and their willingness to share data with other companies in the future.

4.2.1. Data suppliers

Out of the 129 companies that participated in the survey, **39 % of the companies claim to share data with other companies**. A large majority of the data suppliers that responded to the survey share data, mainly within their own business sector. They make available only a small percentage of the data that they generate. They mainly share data in view of developing new business models and/or products or services. APIs are the preferred mechanism for making data available to other companies. Different conditions to share data could be observed, including for free with no or very little restrictions to a specific group of users, in exchange for a service under bilaterally agreed conditions, or against remuneration on a basis of individually negotiated conditions. The figure below summarises the general profile of the data suppliers that responded to the survey organised within the framework of this study. Further details about the different features are provided hereafter.
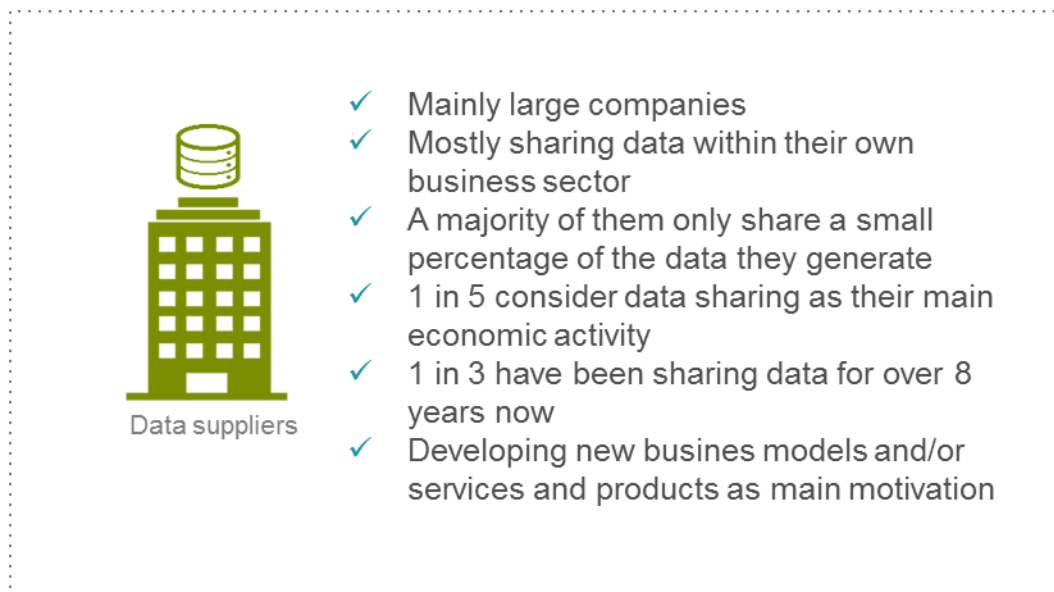
Figure 14. Profile of data suppliers according to the survey findings

Twenty per cent of the data suppliers consider data sharing as their main economic activity at present. The findings of the survey indicate that there are many data suppliers that are currently sharing data as a secondary activity, but plan to make data sharing as their primary activity by 2022. Hence, **data sharing as a main primary activity is expected to grow within the next five years**. More concretely, the percentage of companies sharing data as their primary activity among the current data suppliers is expected to grow to 46 % in the next five years. The figure below shows the comparison between the percentages of data suppliers sharing data as their primary activity in 2017 and in 2022 across various company sizes. The highest increase can be observed in micro-sized and large companies (37 % and 30 % respectively).

Company size	Number of companies currently sharing data (2017)	Number of companies sharing data as their primary economic activity in 2017	Number of companies expected to share data as their primary economic activity in 2022
Large	20	3	9
Medium	13	2	4
Small	6	3	4
Micro	11	2	6
Total	**50**	**10**	**23**

Table 1. Number of data suppliers in 2017 across company sizes, number of data suppliers sharing data as a primary economic activity in the same year and possible future trends
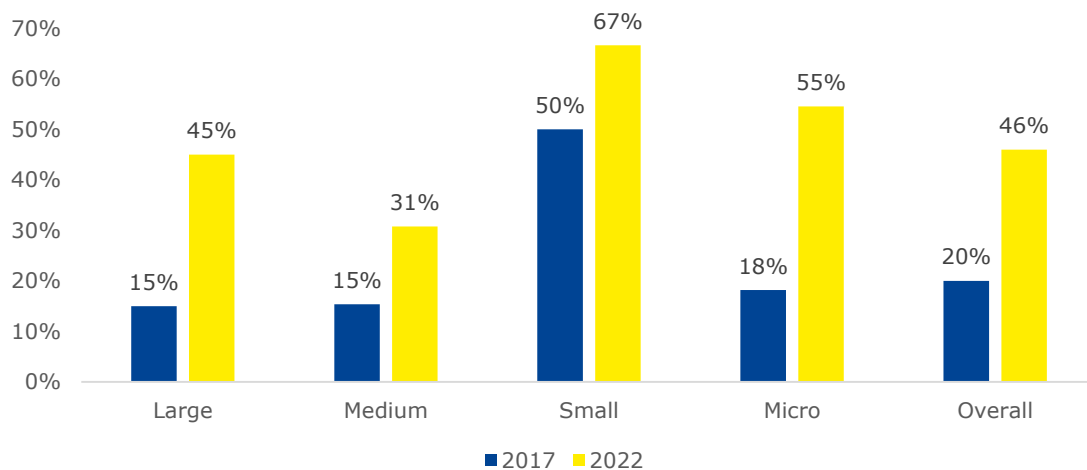
Figure 15. Percentage of companies sharing data as their primary activity in 2017 vs expectations for 2022 across company sizes

The percentage of data suppliers varies across countries, company sizes and business sectors. The figure below shows the number of data suppliers that completed in the survey across countries[113] against the total number of respondents from those countries that participated in the survey.
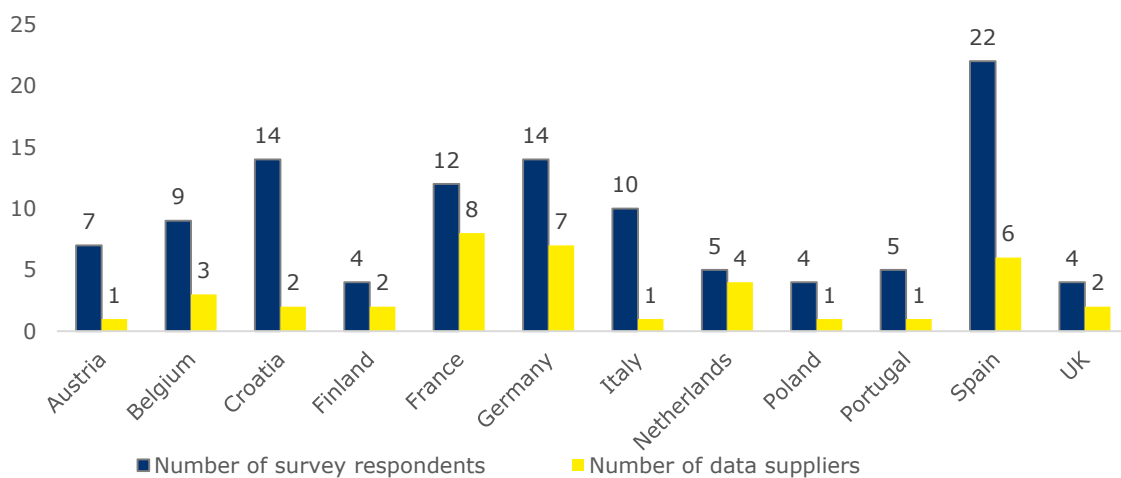
Figure 16. Number of data suppliers by country against the total number of respondents from those countries

Sixty-three percent of the large companies share data with other companies. This percentage appears to be rather high when compared to medium-sized (37 %), small-sized (22 %) and micro-sized companies (31 %). The figure below shows the percentage of data suppliers by company size.

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[113] Only those countries from which four or more companies participated in the survey are represented in the graph.
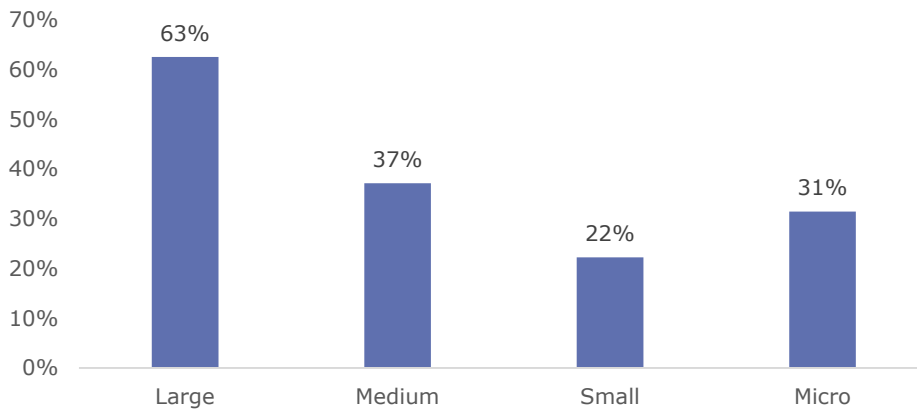
Figure 17. Percentage of data suppliers by company size

Data suppliers appear to be more concentrated in particular sectors like smart grids & meters (75 %) and data-generated driving (57 %). On the other hand, the percentage of data suppliers operating in the sectors of smart manufacturing (19 %) and smart living environments (22 %) is lower. The figure below shows the percentage of data suppliers by business sector.
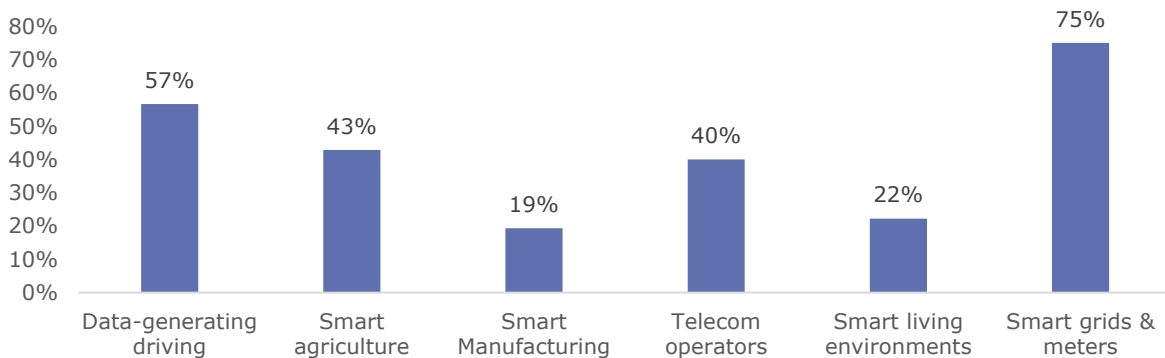
Figure 18. Percentage of data suppliers by business sector

Most data suppliers (90 %) share data within their own business sector. Apart from their own sector, they also seem to share data with sectors operating in IT services (33 %), public sphere (29 %) and research (27 %). The figure below shows the distribution of the main sectors with which data suppliers share their data.
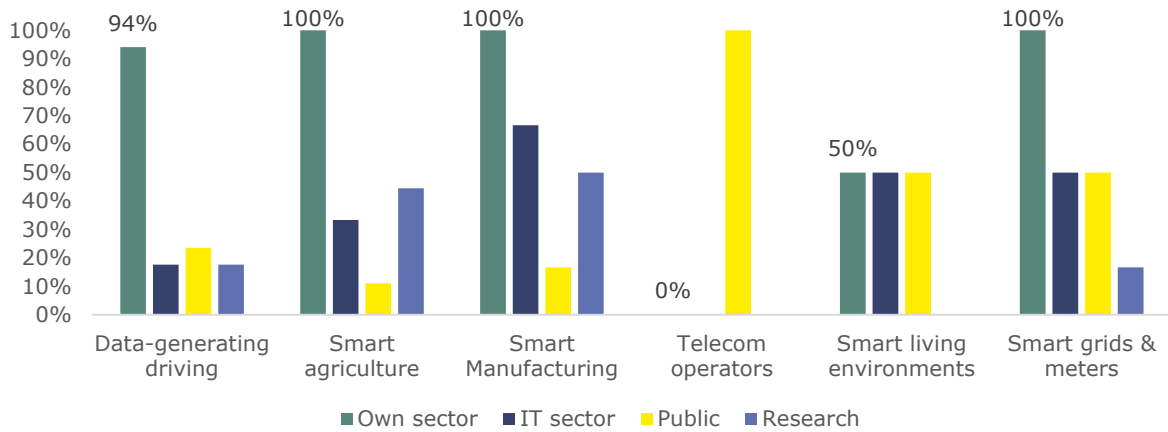
Figure 19. Distribution of the main sectors with which data suppliers share their data (a company could select up to five sectors)

4.2.2. Reasons for sharing data with other companies

Approximately one third of the 50 data suppliers that completed the survey have been sharing data with other companies for more than eight years. The figure below shows the distribution of data suppliers according to the number of years during which they have been sharing data with other companies.
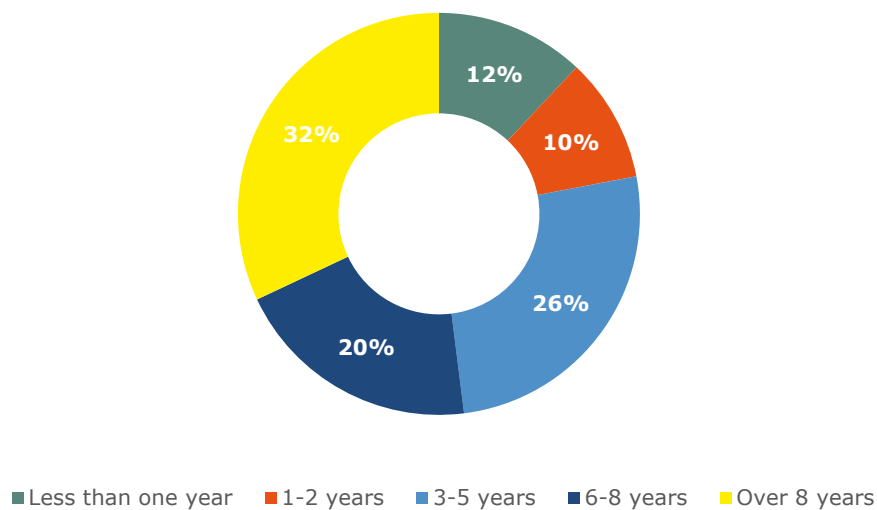
Figure 20. Percentage of data suppliers by the number of years during which they have been sharing data with other companies

Many companies are sharing data with other companies to explore the possibility of developing new business models and/or new products and services (74 %), to establish partnerships with other companies (48 %), and to generate revenue by monetising their data (40 %). The table below provides an overview of the motivations of the surveyed companies to share data with other companies.

Reasons for sharing data	No. responses	%
Possibility to develop new business models and/or products or services	37	74 %
Possibility to establish partnerships with other companies interested in my data	24	48 %
Economic value of the data sold (data revenues)	20	40 %
Legal requirements to share data	13	26 %
Economic incentives to share data (e.g. fiscal incentives, subsidies, etc.)	4	8 %
Other	3	6 %

Table 2. Motivations for B2B data sharing (a company could select up to three reasons)

Although many companies within this sample appear to share data with other companies for some years now, they still face obstacles. It is worth noting that **more than half of data suppliers reported to have encountered obstacles when sharing data with companies**, of which 73 % cited technical obstacles and related costs as one of the main barriers faced[114].

4.2.3.   Characteristics of the data shared

According to the information retrieved from the survey, the two most common types of data shared are data generated by internal IT business systems (information about products, services, sales, logistics, customers, partners or suppliers) (56 %) and data generated by the Internet-of-things (including sensors and mobile phones) (54 %). From these types of data, real-time or near-real-time data[115] (44 %) and transactional data[116] (32 %) are the features of data most commonly shared. The figures below shows the most common types of data and features of data shared by the surveyed companies.
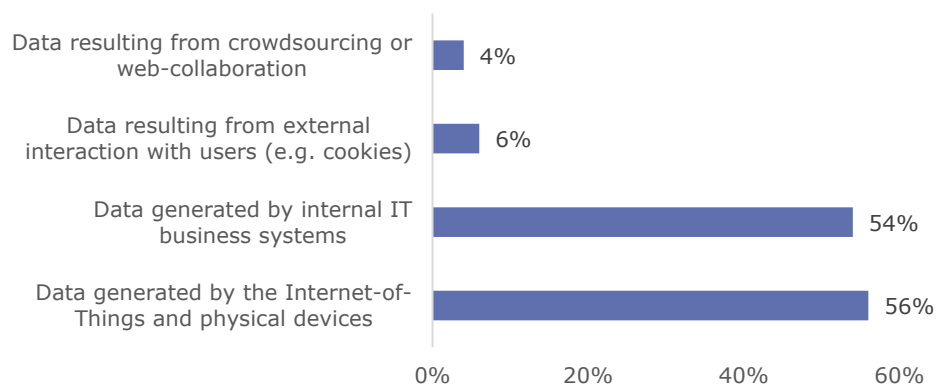
Figure 21. Types of data shared (a company could select up to two types of data)

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[114] An in-depth analysis of the obstacles to data sharing can be found in a dedicated chapter of this report (see chapter 6).

[115] *Real-time or near-real-time data* are defined as data that are delivered with no or hardly no delay after having been collected.

[116] *Transactional data* are understood as data relating to any financial, logistical or business-related processes such as sales orders, purchases, requests, invoices, returns, subscriptions, payments, etc.
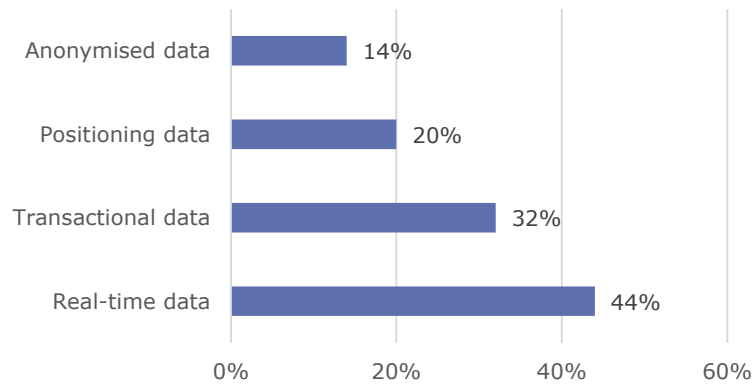
Figure 22. Features of data shared (a company could select up to two types of data)

The large majority of the data suppliers (86 %) that participated in this survey share less than 50 % of the data they generate on a monthly basis. The table and figure below represent the volume of data generated by companies on a monthly basis and the proportion of the data they share with other companies.

Proportion of data shared with other companies	Volume of data generated							
	Up to 10 GB	Up to 100 GB	Up to 1 TB	Up to 10 TB	Up to 100 TB	Up to 1 PB	Do not know	Total
Less than 1%	2%	4%	0%	4%	4%	2%	6%	**22%**
Up to 5%	10%	6%	6%	4%	4%	0%	4%	**34%**
Up to 10%	4%	0%	2%	0%	4%	0%	0%	**10%**
Up to 25%	0%	0%	2%	0%	0%	0%	0%	**2%**
Up to 50%	4%	6%	4%	0%	0%	0%	2%	**16%**
More than 50%	8%	2%	2%	0%	0%	2%	0%	**14%**
Do not know	0%	0%	0%	0%	0%	0%	2%	**2%**
Total	**28%**	**18%**	**16%**	**8%**	**12%**	**4%**	**14%**	**100%**

Table 3. Volume of data generated and proportion of data shared by companies
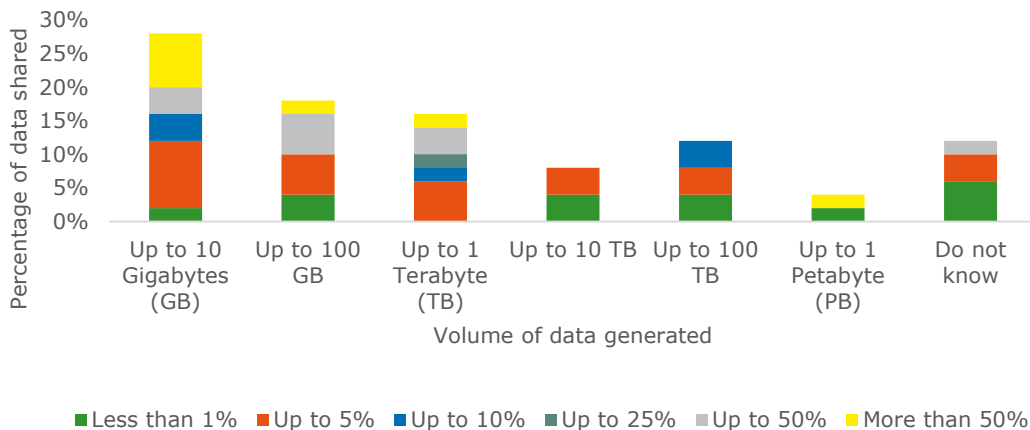
Figure 23. Volume of data generated and proportion of data shared by companies

4.2.4.   Technical mechanisms to share data

Data suppliers make use of different technical mechanisms to share data. Considering the present sample, **Application Programming Interfaces (APIs) appear to be the most preferred technical mechanism to share data with other companies** (64 %). In addition, around half of the companies use their web-based services (58 %) and online data repositories/portals (46 %) as mechanisms to share data with other companies. The table below shows the percentage of data suppliers using each of the technical mechanisms.
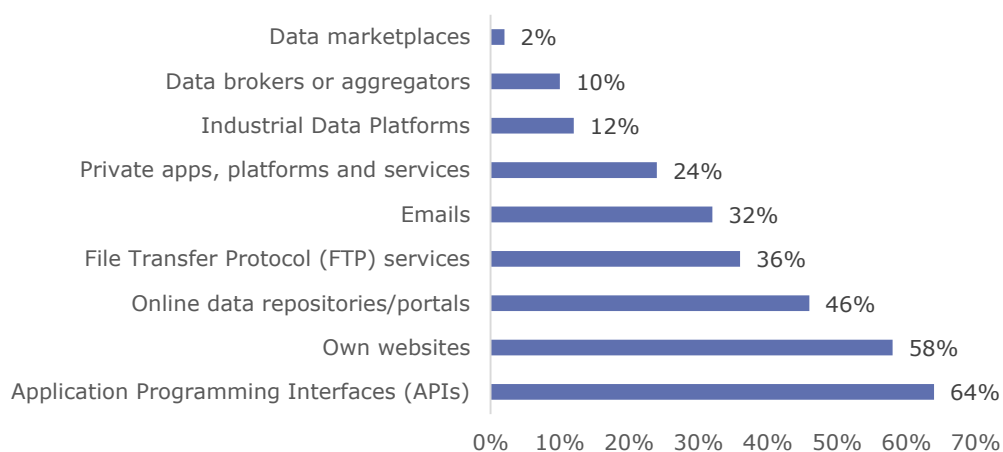
Figure 24. Technical mechanisms for data sharing between companies (a company could select up to four mechanisms)

4.2.5.   Conditions to share data

The data suppliers that participated in the survey choose different conditions to share data with other companies. Many of them are sharing data for free with no or very little restrictions to a specific group of users (40 %). Only a small percentage of data suppliers opted to adopt an open data policy (i.e. sharing data for free to a wide range of users) (8 %). Other conditions to share data include a compensation, either monetary or in exchange of a service. The table below provides an overview of the most common conditions used by data suppliers to share data with other companies.

Conditions under which data are shared with other companies	No. responses	%
For free to a specific group of users and with no or very little restrictions	20	40 %
Compensated by the provision of a service on a basis of individually negotiated conditions	15	30 %
Remunerated to a group of users on a basis of individually negotiated conditions	14	28 %
Remunerated to a wide range of users on a basis of fair and non-discriminatory conditions	9	18 %
Remunerated and on an exclusive basis through individually negotiated conditions	6	12 %
For free to a wide range of users and with no or very little restrictions ("Open Data")	4	8 %

Table 4. Conditions to share data (a company could select up to two conditions)

4.2.6. Average annual income resulting from B2B data sharing

Many of the data suppliers that responded to this survey earn less than EUR 5 000 per year resulting from B2B data sharing (34 %). The figure below represents the average annual income of data suppliers resulting from B2B data sharing activities during the last three financial years.
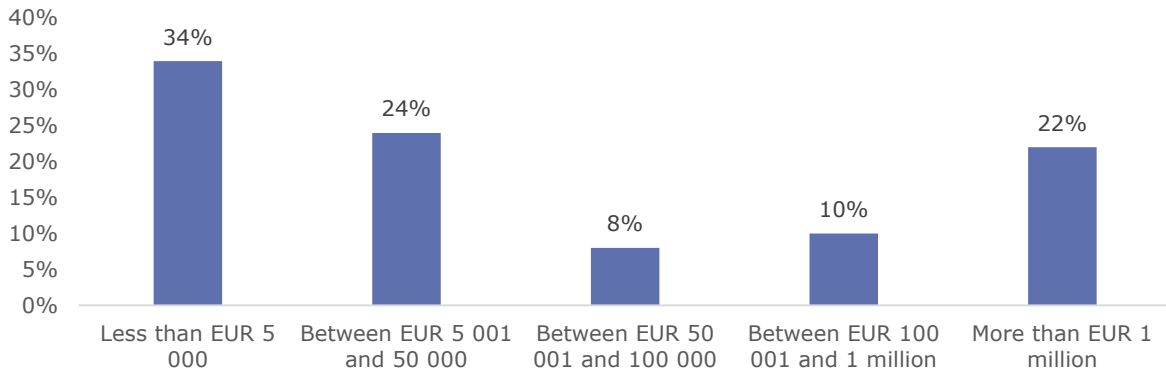
Figure 25. Average annual income of data suppliers resulting from B2B data sharing activities during the last three financial years[117]

Most of the companies earning more than EUR 1 million from B2B data sharing activities are making more than EUR 100 million as their total revenue. The figure below shows the comparison between the average annual income of data suppliers from their data sharing activities and their total revenue in the past three years.
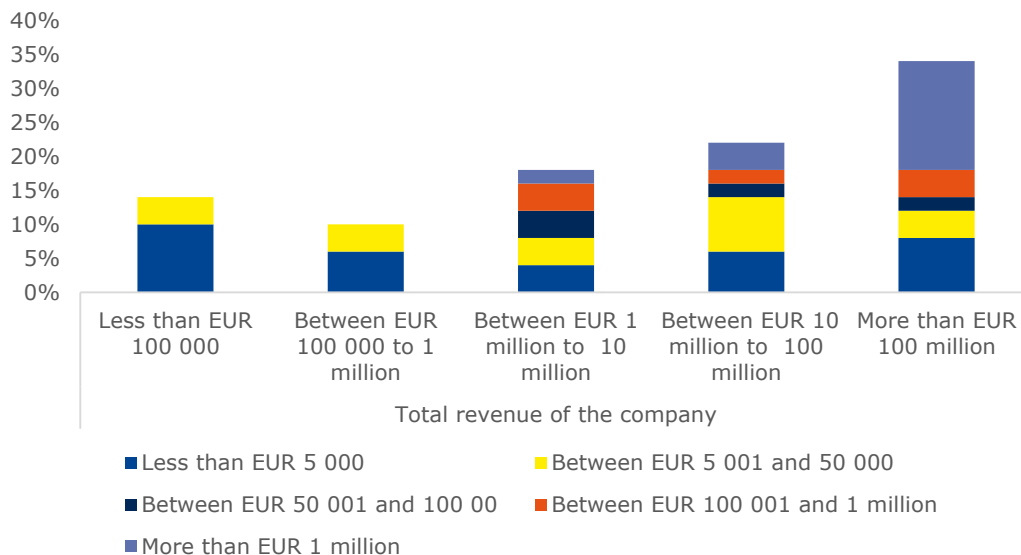
Figure 26. Comparison between average annual income from B2B data sharing activities and the company's total revenue (the percentage indicated is a proportion of the total number of data suppliers)

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[117] The total amounts to 98 % as one of the companies that participated in the survey did not provide information on their annual income resulting from B2B data sharing activities. These figures should be interpreted with caution as several companies reported difficulties in providing an exact amount for their revenues resulting from data sharing.

The figure above also shows that as the proportion of companies engaging in B2B data sharing activities increases, so does the total revenue of the company.

4.2.7.   Companies not yet engaged in B2B data sharing

Out of the 129 respondents, **60 % of the companies do not share data with other companies**. Half of the respondents cited privacy concerns as one of the reasons for not sharing data with other companies. Issues related to trade secrets, fear of misappropriation by others, or considerations of commercial strategy (33 %), lack of demand for their company's data (32 %), the uncertainty about safety, security and liability conditions related to the technical process of sharing data (28 %) and lack of incentives (28 %) were the other common reasons for not sharing data. On the other hand, the lack of appropriate licensing conditions did not appear to be a concern to any of the surveyed companies that have not engaged in data sharing yet.

Reasons	No. responses	%
Privacy concerns	39	49 %
Trade secrets / fear of misappropriation by others / considerations of commercial strategy	26	33 %
Lack of demand for my company's data	25	32 %
Uncertainty about safety, security and liability conditions related to the technical process of sharing data	22	28 %
Lack of incentives to share data	22	28 %
Lack of data skills inside the company	14	18 %
Economic costs of sharing data (e.g. costs of making the data available in the desired format, infrastructure costs related to data collection, data curation costs, etc.)	12	15 %
High efforts and burden on the company to engage in this activity (e.g. collection, analysis, etc.)	12	15 %
Uncertainty about usage rights on the data and potential reputational costs for the company in case of misuse	12	15 %
Difficulties with measuring the value of data	9	11 %
Lack of appropriate licensing conditions	0	0 %

Figure 27. Reasons for not sharing data (a company could select up to five reasons)

One third of the companies that are currently not sharing data see a possibility for engaging in B2B data sharing within the next five years. However, 46 % of the surveyed companies are unlikely to start sharing data in business-to-business relations in a near future. The figure below shows the likelihood for engaging in B2B data sharing with other companies in the next five years.
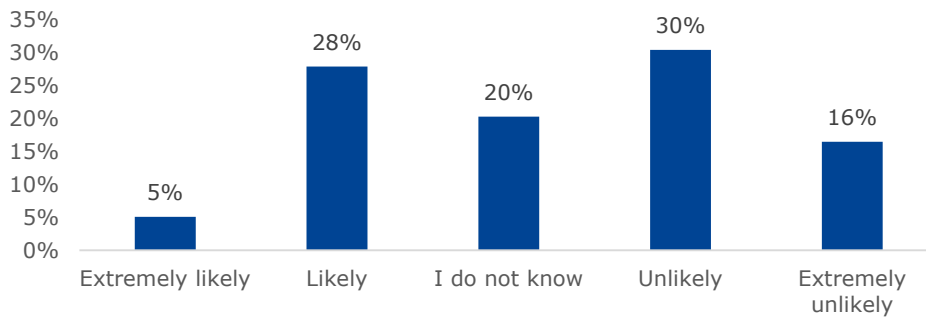
Figure 28. Likelihood for engaging in B2B data sharing in the next five years

Many of the companies that have not yet engaged in B2B data sharing (57 %) perceive benefits in relation to this activity. **All companies that are likely to engage in B2B data sharing in a near future appear to realise that this activity may bring benefits to their company** (see table below), including the establishment of partnerships with other companies (62 %), monetisation of data and possible additional revenues (60 %), and support to innovation (53 %).

Benefits	No. responses	%
Data can allow my company to enter into partnerships with other companies	28	62 %
Data can be monetised and generate revenues for my company	27	60 %
Data support the innovation component of my company	24	53 %

Table 5. Benefits of data sharing (a company could select more than one benefit)

Companies that have not yet engaged in B2B data sharing indicated three main factors that can potentially increase their willingness to share data in the future: legal clarity about "data ownership rights" (62 %), ability to track the usage of data (46 %), and increased certainty about the nature of and procedures related to licensing agreements (42 %). The table below shows the various factors that can potentially increase the willingness to share data in business-to-business relations.

Factors that can increase willingness to share data	No. responses	%
Legal clarity about the "ownership rights" of the data	49	62 %
Ability to track the usage of the data once it has been shared	36	46 %
Certainty about how to share data from a contractual point of view	33	42 %
Availability of the necessary technical skills inside my company to ensure the quality and security of the data shared	23	29 %
An improved framework to protect the investments made for the purpose of data collection, curation, anonymisation, etc.	19	24 %
Availability of standards and/or infrastructure to facilitate the adequate storage, transfer and processing of data	13	16 %
A defined framework for liability in case of damage caused by the data that are shared	12	15 %

Table 6. Factors that can increase the willingness to engage in B2B data sharing in the next five years (a company could select up to four reasons)

The willingness to engage in B2B data sharing varies across sectors. Many companies that are currently not sharing data seem to be interested in engaging in B2B data sharing particularly with two business sectors, including manufacturing and processing (39 %) and IT services (34 %). The figure below shows the willingness of companies to share data with different sectors[118].
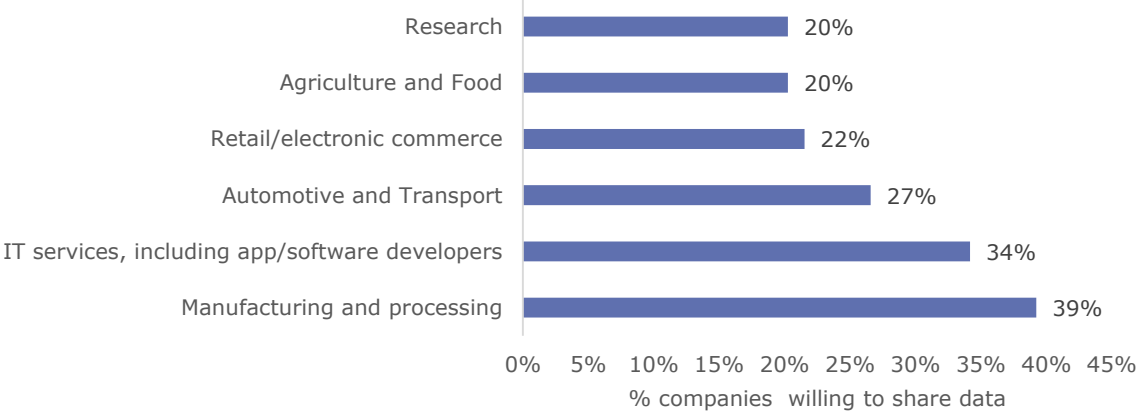
Figure 29. Willingness to engage in B2B data sharing in the next five years by sector (a company could select up to five sectors)

4.3. Data re-use between companies in the EEA

This section attempts to quantify data re-use in B2B relations in the EEA. After ascertaining the percentage of companies that claim to re-use data from other companies (hereafter referred to as 'data users') and describing their demographic attributes, a descriptive data analysis is made in relation to the reasons driving companies to re-use data from others, the type of data re-used, preferred mechanisms to access data from other companies, the selected sectors to do so, the conditions to be able to re-use data from other companies, as well as the costs to access data from data suppliers. Finally, this section also looks into the companies that currently do not re-use data from other companies, the reasons for not doing it, and their willingness to engage in B2B data re-use in the future.

4.3.1. Data users

Out of the 129 companies that completed the survey, **42 % of the companies declared to re-use data from other companies**. Mirroring the profile of data suppliers, a large majority of data users tend to re-use data from their own business sector. Many data users acknowledged their dependence on external data to advance their business goals, in particular to develop new products and services, or to improve their existing catalogue. Real-time or near real-time data are the type of data they re-use the most. Data are mainly accessed for free or against remuneration or under

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[118] Although 18 sectors were listed in the survey questionnaire, only those sectors with a response rate equal or higher than 10 % are shown in the figure.

bilaterally agreed conditions. The figure below summarises the general profile of data users. Further details about the different features are provided hereafter.

✓ Mainly large companies
✓ Mostly re-using data from their own sector
✓ 7 in 10 highy depend on data for their business
✓ Half of them have been re-using data for over 6 years
✓ Developing new busines models and/or services and products as main motivation

Data users

Figure 30. Profile of data users according to the survey findings

Most data users highly depend on external data to achieve their business goals. As shown in the figure below, most of the companies (70 %) re-using data consider that accessing data from other companies is either very or extremely important to their business.

■ Not important ■ Somewhat important ■ Very important ■ Extremely important
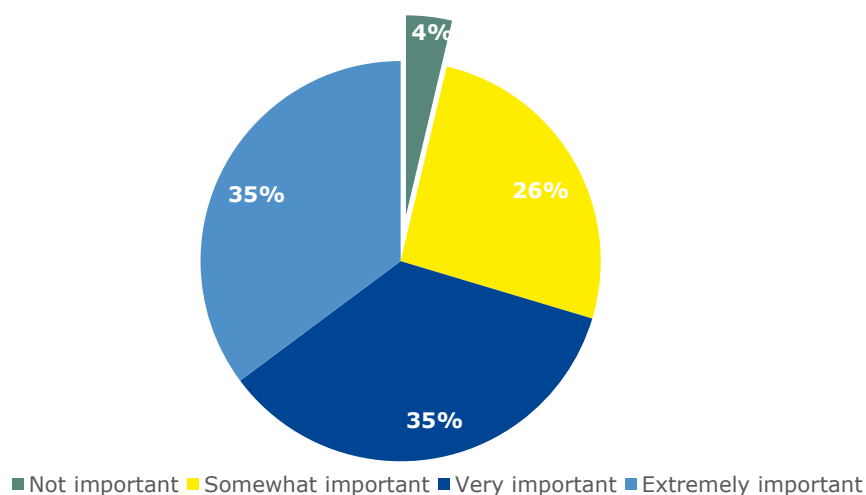
Figure 31. Importance of re-using data from other companies to business goals

The percentage of data users varies across countries, company sizes and business sectors. The figure below shows the number of data users by country[119] against the total number of respondents from those countries that participated in the survey.

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[119] Only those countries from which at least four companies participated in the survey are represented in the graph.
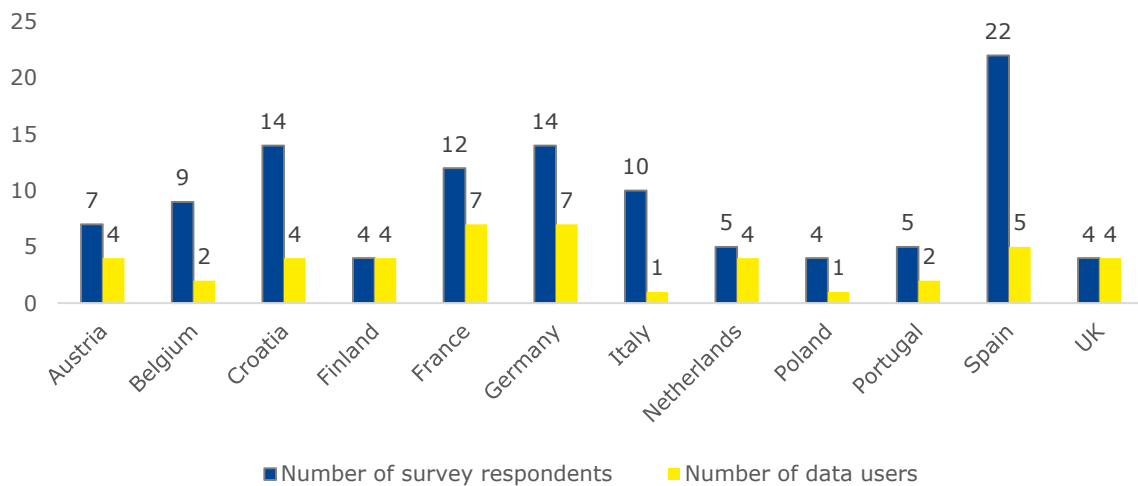
Figure 32. Number of data users by country

Sixty-three percent of the large companies re-use data from other companies. This percentage appears to be rather high when compared to medium-sized (31 %), small-sized (30 %) and micro-sized companies (43 %). The figure below shows the percentage of data users by company size.
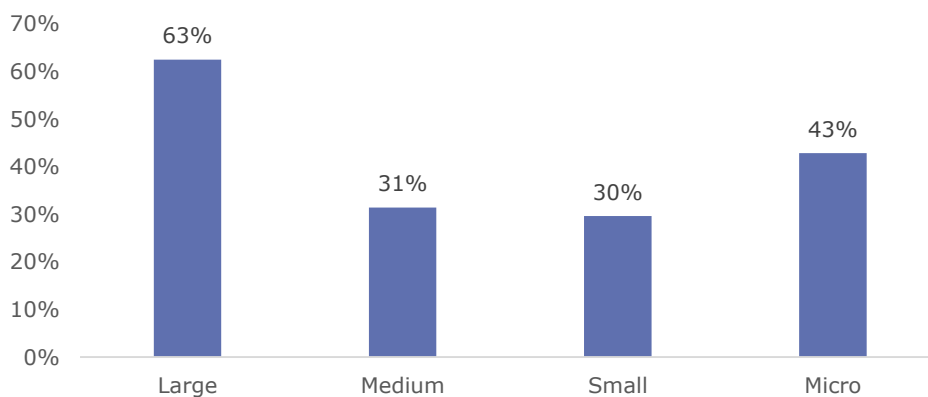
Figure 33. Percentage of data users by company size

Data users appear to be more concentrated in particular sectors like data-generating driving (67 %), smart agriculture (57 %) and smart grids & meters (50 %). On the other hand, the percentage of data users operating in the sectors of smart living environments (33 %), smart manufacturing (26 %) and telecom (20 %) is lower. The figure below shows the percentage of data users by business sector.

48
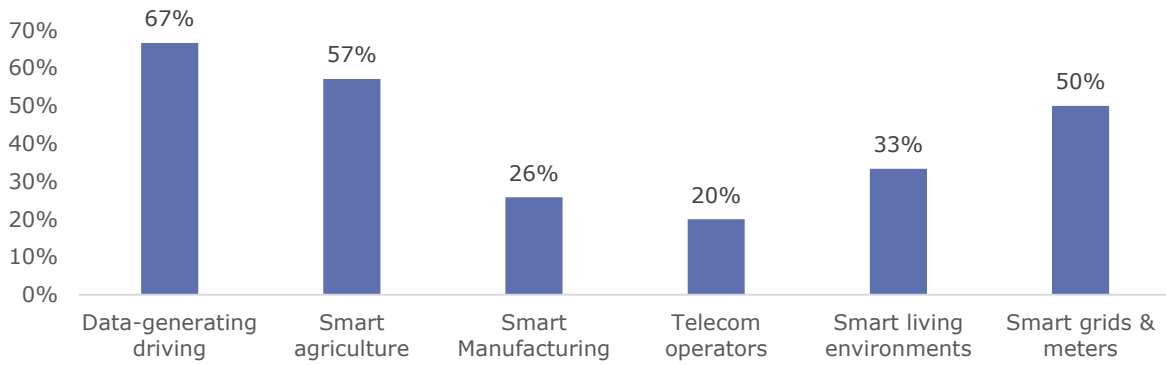
Figure 34. Percentage of data users by business sector

Many data users are accessing data from their own business sector (83 %), but they also re-use data from sectors like IT services (35 %), public sector (21 %) and research (15 %). It is interesting to note that half of the data users from the data-generating driving sector are accessing data from companies operating in the wholesale trade sector. The figure below shows the distribution of the main sectors from which data are being re-used by the sector[120] to which a company belongs.
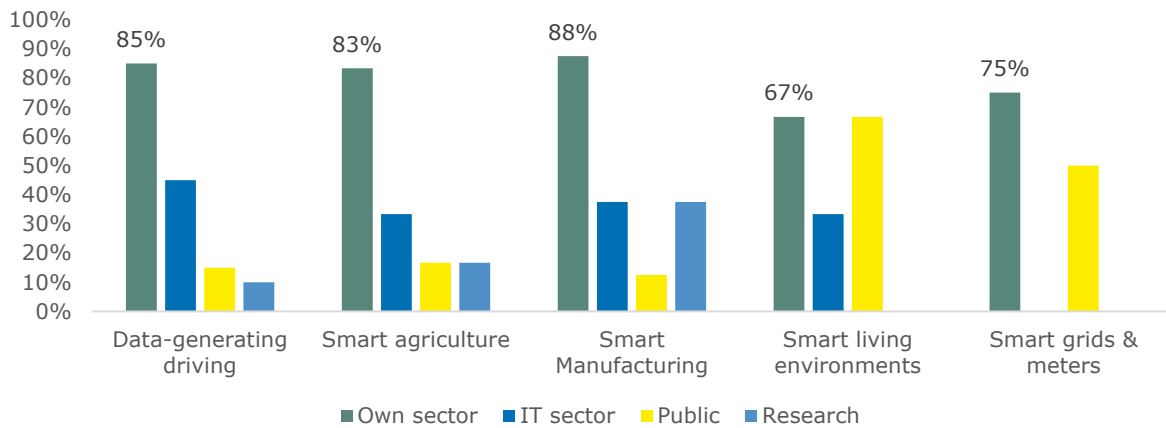
Figure 35. Distribution of the main sectors from which data users access data (a company could select up to five sectors)

4.3.2. Reasons for re-using data from other companies

Slightly more than half of the surveyed companies (53 %) have been re-using data from other companies for more than six years. The figure below shows the distribution of data users according to the number of years during which they have been re-using data from other companies.

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[120] The telecom sector is not included as only one company from this sector declared to be re-using data.
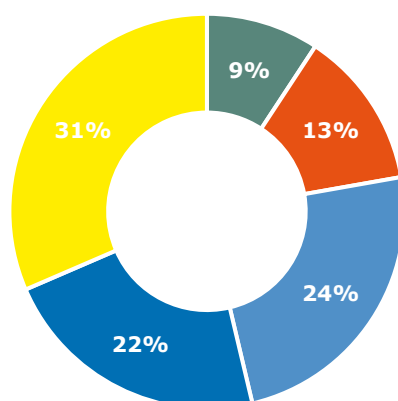
Likewise many data suppliers, **many companies are re-using data from other companies to explore the possibility of developing new products and/or services** (59 %), enhance the catalogue of products and services (57 %), and improve the efficiency of the company (39 %). The table below provides an overview of the motivations of data users to access data from other companies.

Reason for re-using data	No. responses	%
Re-using data from others supports the development of new products and/or services	32	59 %
Re-using data from others helps my company to improve its catalogue of products and/or services	31	57 %
Re-using data from others makes my company more efficient	21	39 %
Re-using data from others improves my company's relations with clients	17	31 %
Re-using data from others optimises the internal processes of my company	9	17 %
Re-using data from others allows my company to launch more targeted marketing campaigns	7	13 %

Table 7. Motivations for data re-use (a company could select up to three reasons)

Although many data users across the EEA appear to access data from other companies for some years now, obstacles are still faced. **Fifty-nine percent of the data users declared to have encountered some obstacles when attempting to access data from other companies**. Two thirds of these data users reported to have been denied access to data as the main issue[121].

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[121] The obstacles to data re-use are analysed in more detail in a dedicated chapter of this report (see chapter 6).

4.3.3. Characteristics of data re-used

Consistent with the findings about data shared, the two most common types of data re-used by the companies that completed the survey are data generated by the Internet-of-Things and physical devices (including sensors and mobile phones) (59 %) and data generated by internal IT business systems (mainly containing information about products, services, sales, logistics, customers, partners or suppliers) (50 %). From these types of data, real-time or near-real-time data (59 %), transactional data (30 %) and localisation/positioning data (30 %) are the features of data most commonly re-used. The figures below show the most common types and features of data re-used by the surveyed companies.
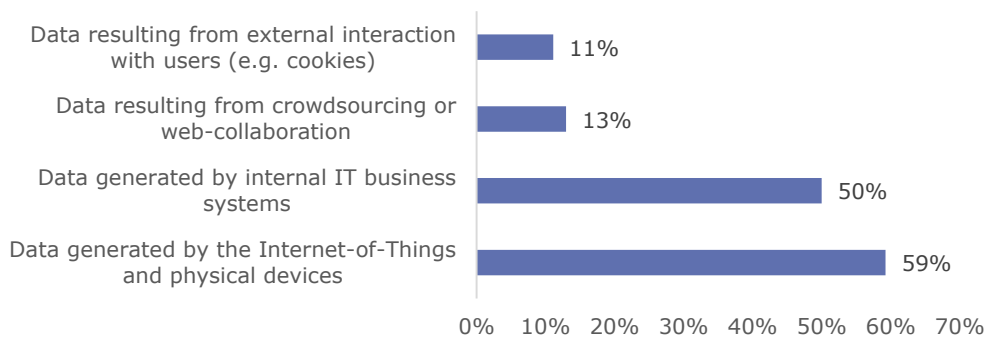
Figure 37. Types of data re-used (a company could select up to two types)
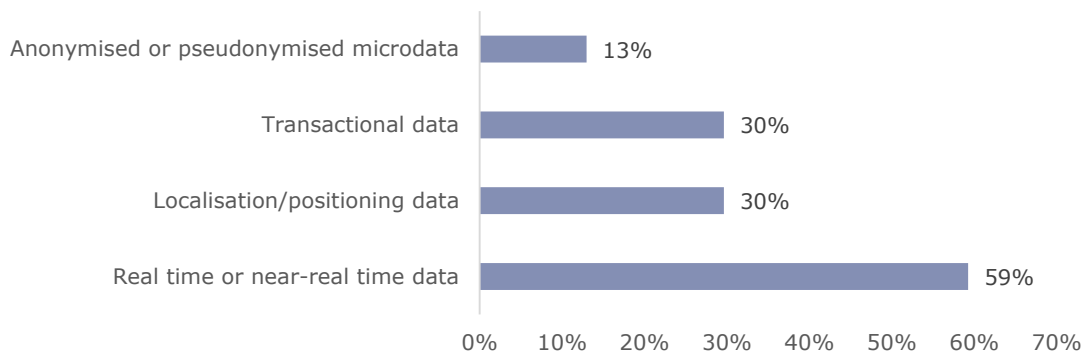
Figure 38. Features of data re-used (a company could select up to two features)

More than 60 % of the data users that completed the survey are accessing up to 100 Gigabytes of data on a yearly basis. The figure below shows distribution of data users by the volume of data accessed from other companies.
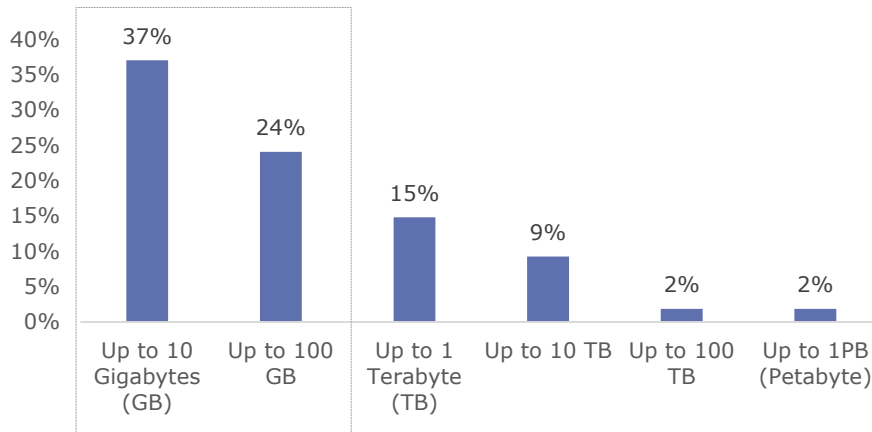
Figure 39. Distribution of companies by volume of data re-used

Consistent with previous findings, **Application Programming Interfaces (APIs) appear to be the most common technical mechanism to access data from other companies** (74 %). In addition, many companies use File Transfer Protocol (54 %), online data repositories/portals (48 %) and private app platforms (35 %) as mechanisms to access data from other companies. The figure below shows the technical mechanisms utilised by data users to access data from other companies.
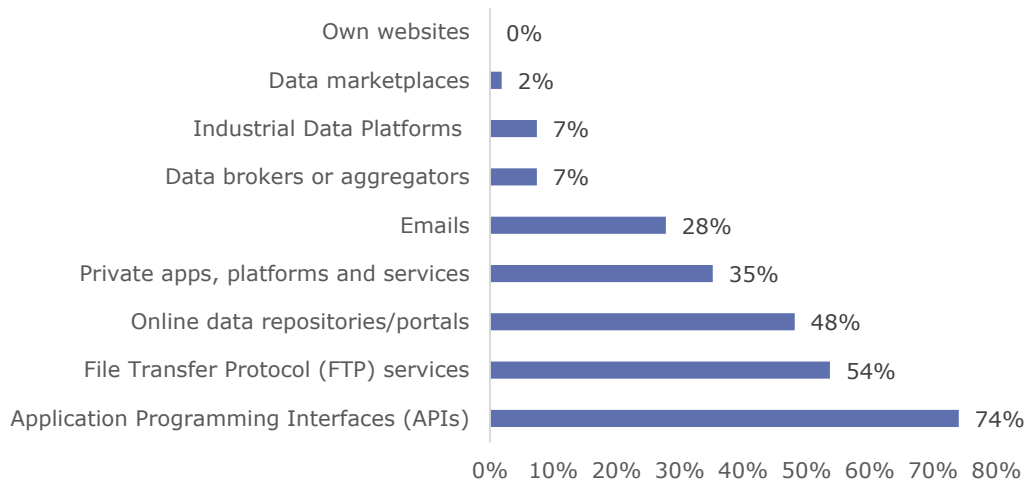
Figure 40. Technical mechanisms utilised to access data from other companies (a company could select up to four mechanisms)

4.3.4.   Conditions to re-use data

There is a quite balanced distribution of the various conditions under which data users are accessing data from other companies. Data are either be accessed for free, against remuneration, or even compensated by the provision of a service. The following table provides an overview of the conditions under which data users have been accessing data from other companies.

Conditions under which companies access data	No. responses	%
For free to a wide range of users and with no or very little restrictions (Open Data)	17	31 %
Remunerated and on an exclusive basis through individually negotiated conditions	13	24 %
For free to a specific group of users and with no or very little restrictions	12	22 %
Remunerated, to a specific group of users, on a basis of individually negotiated conditions	12	22 %
Remunerated, to a wide range of users, on a basis of fair and non-discriminatory conditions	11	20 %
Compensated by the provision of a service on a basis of individually negotiated conditions	10	19 %

Table 8. Conditions under which companies access data (a company could select up to two conditions)

4.3.5.   Average annual expenditure on data re-use

More than 40 % of the data users have spent on average more than 50 000 EUR per year to access data from other companies in the last three financial years. Conversely, a similar percentage of data users (39 %) have only spent on average up to 5 000 EUR a year to access data from other companies during the same period. The figure below shows the distribution of data users by the average annual expenditure to access data from other companies during the three last financial years.
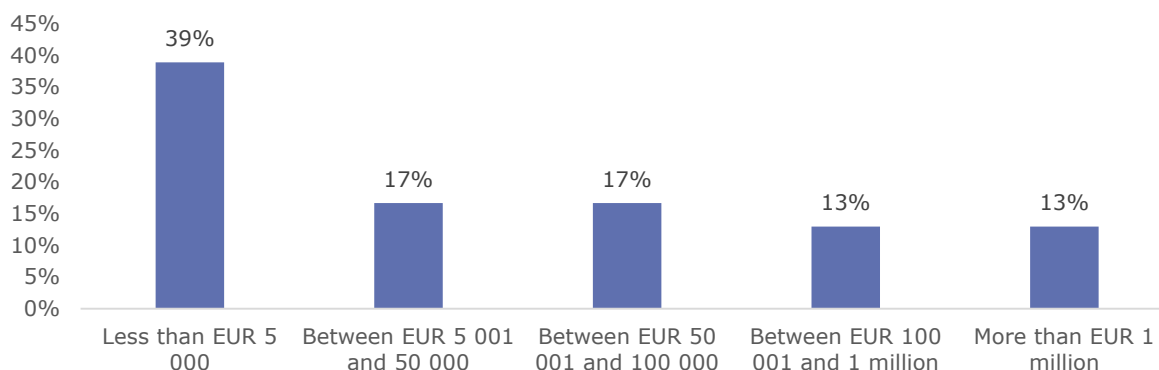
Figure 41. Distribution of data users by average annual expenditure to access data from other companies during the three last financial years[122]

4.3.6.   Companies not yet engaged in B2B data re-use

Out of the 129 respondents, **58 % of the companies do not re-use data from other companies**. The most common reasons for not engaging in B2B data re-use include having all relevant data produced in-house (41 %), data not being used in the company's business model (39 %), and the unavailability of data needed/required for achieving the company's goals (32 %). Other reasons cited by respondents can be found in the table below.

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[122] The total amounts to 99 % as one of the companies that participated in the survey did not provide information on their annual expenditure to access data from other companies.

Reasons	No. responses	%
We produce the data we need in-house	31	41 %
We do not use data for our business model	29	39 %
The data we would need are not available	24	32 %
Safety, security and liability reasons	17	23 %
Economic costs (i.e. fees, data analysis, data curation, etc.)	14	19 %
Uncertainty about "ownership rights" and usage of the data	8	11 %
Lack of expertise within the company to use the data	8	11 %

Table 9. Reasons for not re-using data (a company could select up to three reasons)

Forty percent of the companies that have never re-used data see a possibility for engaging in B2B data re-use within the next five years. The figure below shows the likelihood of companies that participated in this survey to become data users in the future.
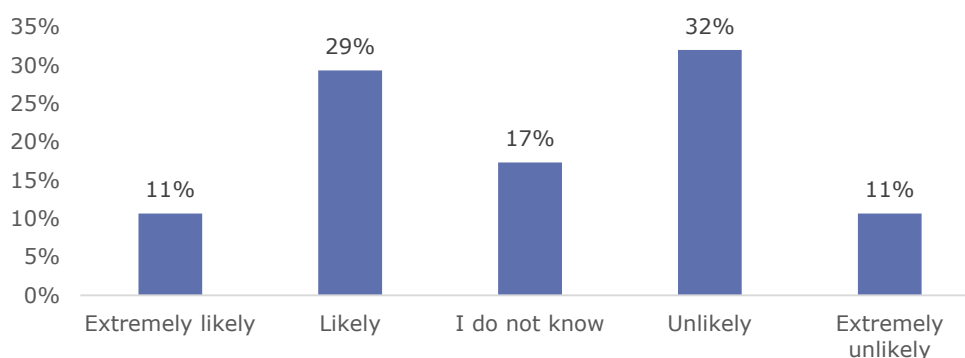
Figure 42. Likelihood of companies to start re-using data from other companies in the next five years

Almost half of the companies (47 %) that are currently not re-using data from other companies see potential benefits in engaging in B2B data re-use in the future. The expected benefits of data re-use include supporting the development of new products and/or services (74 %), improving a company's relationship with clients (43 %), enhancing a company's catalogue of products (43 %) and marketing efforts (37 %), increasing productivity (34 %) and reducing costs (11 %).

Benefits	No. responses	%
Data can support the development of new products/services	26	74 %
Data can improve my catalogue of products and/or services	15	43 %
Data can improve my relation with the clients	15	43 %
Data can improve my marketing efforts	13	37 %
Data can increase my company's productivity and/or efficiency	12	34%
Data can contribute to cost reductions	4	11%

Table 10. Benefits of data re-use (a company could select up to three benefits)

The companies that perceived benefits in data re-use showed interest in accessing data from different sectors. IT (46 %) and manufacturing and processing (43 %) appear to be the most interesting sectors to access data from in a near future. The figure below shows the different sectors[123] from which companies could be interested in accessing data.
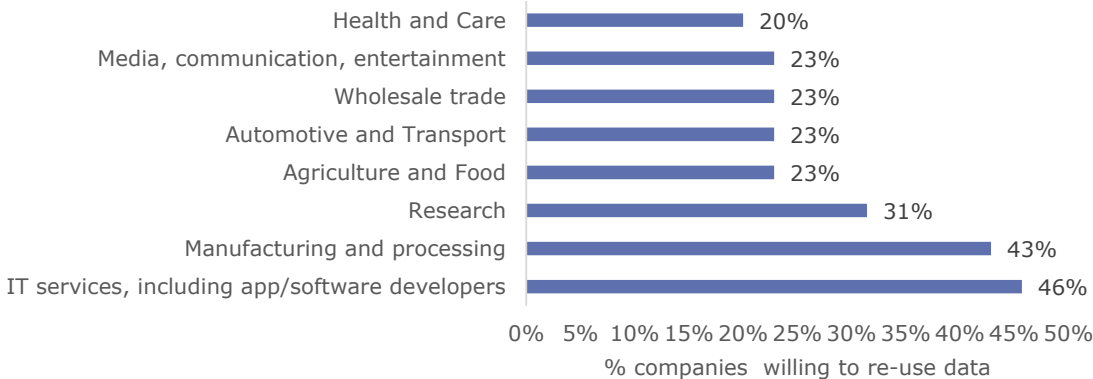
Figure 43. Willingness to engage in B2B data re-use in the next five years by sector (a company could select up to five sectors)

4.4. Missed business opportunities in the context of B2B data sharing in the EEA

Within the framework of this study, missed business opportunities are understood as new or improved products and/or services that a company was not able to bring to the market due to the impossibility of accessing data from other companies. A simplistic representation of the concept is presented hereafter.
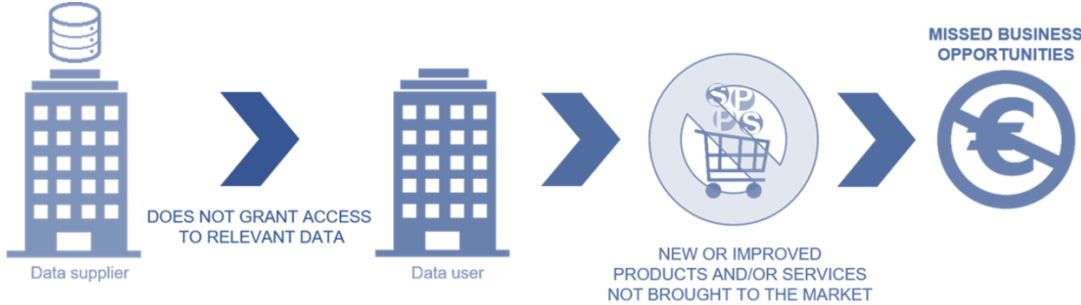
Figure 44. Simplistic representation of the concept of 'missed business opportunities'

In order to attempt to estimate missed business opportunities resulting from the lack of access to relevant data from other companies, a statistical model was developed using the data and information collected through the survey (a detailed description of the model can be found in annex 1). This model was built following the general assumption

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[123] Although 18 sectors were listed in the survey questionnaire, only those sectors with a response rate equal or higher than 20 % are shown in the figure.

that data users (i.e. companies re-using data from other companies) are more likely to bring more new or improved products and/or services to the market than companies that do not re-use data from other companies. In turn, the number of new or improved products and/or services brought to the market by companies was predicted by using demographic attributes of the respondents, aspects related to data re-use (e.g. expenditure on accessing data, volume of data re-used) and a few macro-economic indicators (e.g. gross domestic product). The model does not consider other factors like companies' expenditure on research and development, or product life cycle.

A Generalised Linear Model[124] was chosen[125] to predict the number of new or improved products and/or services a company brings to the market on an annual basis. One of the goals of building a linear model is to segregate the impact of various factors in order to quantify the actual impact of data re-use. The model enables the isolation of the impact of data re-use and the impact of another selected variable on the number of new or improved products and/or services brought to the market.

From the 15 variables tested (complete list can found in annex 1), five variables proved to have a positive impact on the number of new or improved products and/or services a company can bring to the market, namely: expenditure on data re-use, with a varying impact if real-time or localisation/positioning data are being accessed, the size of the company, lifespan of the company[126], and presence of the company abroad[127]. The figure below shows the variables which were statistically significant[128] in predicting the number of new or improved products and/or services brought to the market.
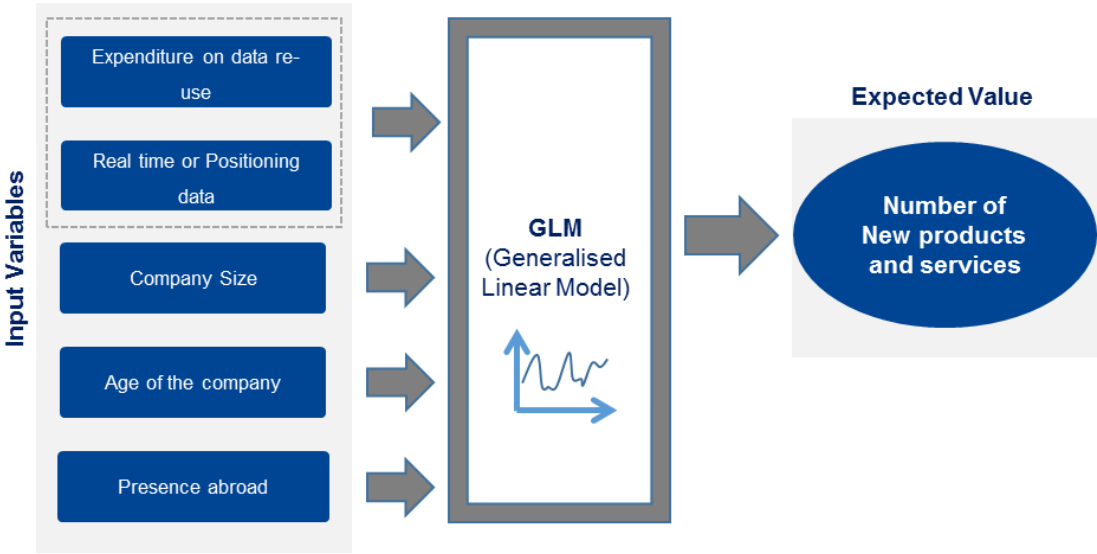
Figure 45. Generalised Linear Model to predict the number of new or improved products and/or services brought to the market

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[124] Hardin, J.W. and J. M. Hilbe (2007), Generalized Linear Model and Extensions, Second Edition. Stata Press.
[125] The number of new products and/or services brought to the market by companies consist of a particular statistical data type (*count data*) which is not normally distributed. Moreover, the variability in the number of new products and/or services is unequal across various predictor variables. Finally, the range of new products and/or services brought to the market by the survey respondents was too wide (i.e. ranging from zero to 10 000).
[126] Number of years a company is operating since its creation.
[127] A company operates in another country(ies) other than the country where the company is headquartered.
[128] *Statistically significant* implies that a relationship between the variable of interest and predictor variables is caused by something other than random chance (with a confidence interval of 95 %).

Based on the results from the linear model, it is possible to infer that **investing a significant amount of money on real-time or localisation/positioning data, can substantially impact on the number of new or improved products and/or services a company can bring to the market**.

More concretely, the model showed that such impact only materialises when investments in accessing data from other companies go above a certain threshold. In the survey, nine ranges of average annual investment in re-using data held by other companies were defined[129]. The ranges were established building on the findings from prior research[130] and were aimed at helping companies provide an indicative figure of their expenditure on data re-use. In the analysis, the results were aggregated into three ranges in order to gather sufficient data for each of these ranges that would enable to make more precise estimations[131]. The new thresholds discussed below should be therefore interpreted as an indication rather than as real cut-off points. A distinction between the access to real-time or localisation/positioning data and into other types of data was also ensured. From the findings, it appears that investing up to EUR 50 000 a year in accessing data from other companies did not have a significant impact on the number of new or improved products and/or services a company brought to the market. For companies that spent between EUR 50 000 and one million on an annual basis during the last three financial years, it was possible to identify a positive correlation with an increase in the number of new or improved products and/or services brought to the market, which reached factor 7.5, but only when real-time or localisation/positioning data were accessed. For companies that invested between EUR 50 000 and one million a year but did not accessed real-time or localisation/positioning data, the impact on the number of new or improved products and/or services brought to the market was not significant.

It is also interesting to note that the companies that spent over one million euros on an annual basis during the last three financial years *and* accessed real-time or localisation/positioning data had even a higher impact (16.6 times) on the number of new or improved products and/or services brought to the market.

The figure below shows how expenditure on data re-use and access to real-time or localisation/positioning data impact on the number of new or improved products and/or services brought to the market. All companies that completed the survey and reported to have spent more than EUR 1 million in accessing data from other companies declared to have re-used real-time and/or positioning data. The figure below does not display any conclusion for companies spending over EUR 1 million on data re-use (other than real-time or positioning data) as none of the respondents fitted in this category.

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[129] The ranges used referred to the last three financial years and can be found in questionnaire in Annex 2.

[130] The study by IDC and Open Evidence on the EU Data Landscape, *op. cit.*, found that SMEs spent on average EUR 27 000 in 2016 to access data from others, while larger companies with 250 employees and more spent EUR 6 million, with an overall average expenditure across company sizes of EUR 91 000.

[131] The aggregated ranges are: Up to EUR 50 000, between EUR 50 000 and 1 million and more than EUR 1 million.
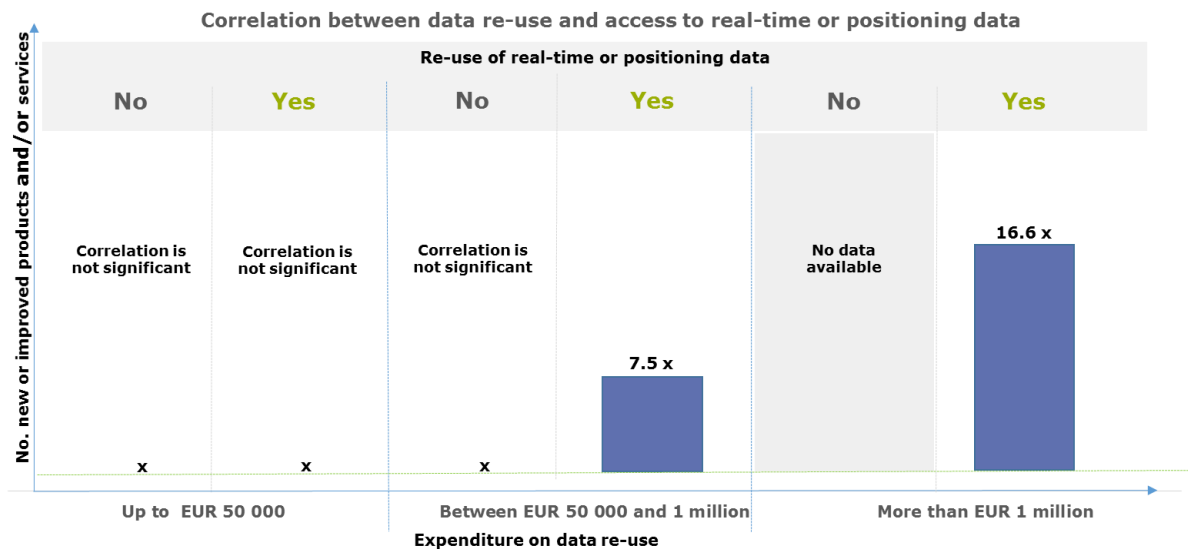
Figure 46. Impact of expenditure on data re-use and access to real-time or localisation/positioning data on the number of new or improved products and/or services brought to the market[132]

As explained above, the model also allowed for the identification of other variables that had a positive impact on the number of new or improved products and/or services a company could bring to the market, including:

- **Company size:** the size of companies had a significant impact on the number of new or improved products and/or services a company can bring to the market. Particularly, medium-sized companies could bring on average 2.6 times more new or improved products and/or services to the market compared to micro or small-sized companies. Similarly, large companies could bring on average 3.4 times more new or improved products and/or services to the market compared to micro or small-sized companies.
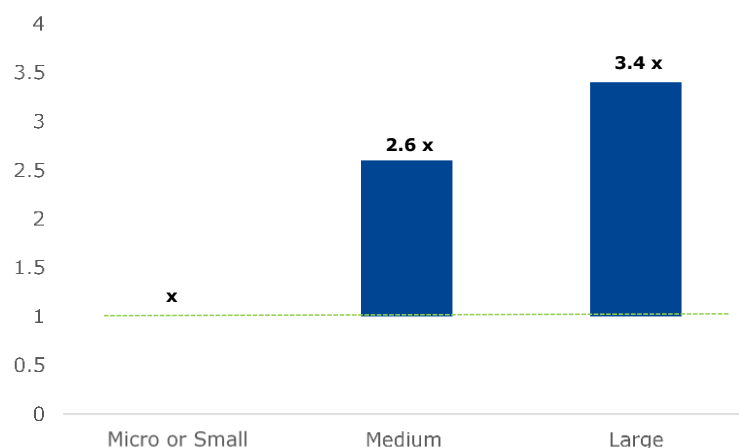
Figure 47. Impact of company size on the number of new or improved products and/or services brought to the market

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[132] The different categories of expenditure on data re-use (see section 4.3.5) were combined into three groups in order to have sufficient data at each category level to estimate its impact.

- **Age of the company:** The lifespan of a company also appears to have impacted positively on the number of new or improved products and/or services a company could bring to the market.

- **Presence abroad:** Companies operating in more than one country and re-using data from other companies appear to have been able to bring more new or improved products and/or services to the market.

Although the results from this analysis need to be interpreted with caution, it is possible to put forward a few **concluding remarks**. Companies that did not invest more than EUR 50 000 in accessing data, particularly real-time or localisation/positioning data, from other companies appear to be missing business opportunities. Out of the 129 companies that participated in the survey, 108 companies were thus found to be missing business opportunities. On the other hand, 20 companies are investing more than EUR 50 000 in accessing real-time or localisation/positioning data from other companies and thus enhancing their business opportunities. The figure below shows the number of companies that missed business opportunities due to lack of substantial investment in accessing real-time or localisation/positioning data from other companies. Finally, companies with a certain size (particularly medium-sized or large companies), operating in more than one country for several years can expect higher payoffs by investing more than EUR 50 000 in accessing real-time or localisation/positioning data from other companies.
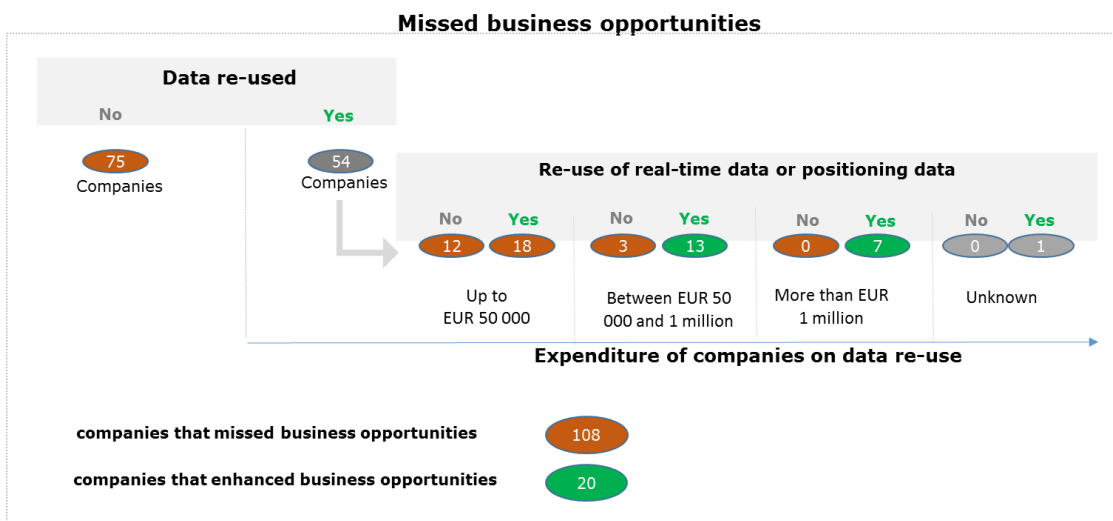
Figure 48. Number of companies that missed business opportunities

5. Illustrative cases of companies sharing data in B2B relations in the European Economic Area

In order to deepen the understanding about B2B data sharing and to inspire other companies throughout the European Economic Area (EEA), this study compiled 16 case studies showcasing businesses that are already engaged in this activity. These companies were identified against a set of criteria through desk research and through the survey. These criteria included: representation of all sectors and company sizes targeted within the framework of this study; identification of companies headquartered in different countries; portrayal of companies using distinct technical mechanisms to share data; and depiction of businesses sharing data with a wider audience or exclusively with selected groups of users. After identifying the companies, these were invited to participate in an interview to gather relevant information to describe their respective case studies. Detailed information about the methodology followed to compile the case studies is available in annex 1. Considering the information collated, some conclusions can be drawn in relation to B2B data sharing in Europe. This chapter discusses different approaches to B2B data sharing and provides a comparative overview of the case studies compiled for the purpose of this study. These approaches should be carefully interpreted because they do not aim at representing all features or forms that B2B data sharing can take. Finally, short summaries of each case study are presented to exemplify some of the characteristics of B2B data sharing in the EEA.

5.1. Approaches to B2B data sharing

The experiences shared by the companies featuring in the 16 case studies brought together in this study helped to shed some light into different approaches to B2B data sharing in the EEA.

Although the concept of B2B data sharing has emerged only recently, **some companies have been making available data to other companies for several years now**. This finding has been confirmed through the survey undertaken within the framework of this study (see section 4.2.), but is also evidenced in a few case studies. Examples of forerunners include Airbus, HERE, Michelin and TomTom which engaged in B2B data sharing during the 80s and 90s.

B2B data sharing is not the main economic activity for nearly half of the companies studied. For instance, Orange's or Telefónica's net profit originates mainly from their telecom activities. Nevertheless, these particular companies decided to engage in B2B data sharing because they wanted to add value to services provided to their business customers. Other examples of companies engaged in B2B data sharing as a secondary economic activity include geo, MAN, Michelin or Van den Borne Aardappelen. On the other hand, there are companies that share data as their main economic activity. For instance, HERE and TomTom make most of their revenues from sharing data they generate.

Considering the companies featuring as case studies, **data are usually shared with a specific group of users**. While some companies restrict the use of their data to some companies (e.g. TomTom), other enterprises set up closed environments for their partners to exclusively share data among them (e.g. MAN). Other examples include vetting the participation of companies in a data exchange platform (e.g. Dawex) or empowering the users of a technical solution to decide with whom they want to share their data with (e.g. DKE-Data). However, **there are companies choosing to open their data to a wider audience**, such as Elering and Enedis. This can be explained by the legal nature of these companies, as well as obligations to share data in the energy sector.

Different technical mechanisms are being used to share data: from e-mails, file hosting and cloud services to Application Programming Interfaces (APIs) and Software Development Kits (SDKs). Despite the fact that basic technical solutions are being used to effectively share data between companies (e.g. through file sharing services as it has been the case for Van den Borne Aardappelen), **APIs appear to offer several advantages in relation to other technical mechanisms**. As discussed by some companies (like geo or TomTom), APIs allow for an easy and quick access to data and, at the same time, to monitor data usage and to act upon cases of data misuse.

Relevant insights were collected in relation to the **business models** adopted by the different companies that accepted to participate in this study. These insights allowed for the identification of five different approaches to B2B data sharing.

Data monetisation

There are companies that put in place a unilateral approach to share data. **Data monetisation** is an approach adopted by companies that aim at making revenue from the data they generate and/or have access to (with due permission from private individuals). For instance, geo licenses the use of anonymised data collected by the devices it makes available to consumers (e.g. energy use of household appliances) in an aggregated or derivative form to third parties (mainly companies operating in the energy and utility sector) based on the consumers' consent. Van den Borne Aardappelen monetises its data (e.g. soil information and crop data) to agrochemical and seed companies. **Data can also be monetised through the provision of services**. For example, Michelin incorporates its data in services provided to other companies. Telefónica, on the other hand, created a dedicated unit that provides access to anonymised or aggregated insights derived from the data that the company holds (e.g. crowd movement data). It does not provide access to 'raw' micro-data from clients.

Data supplier   Data user

✓ Unilateral approach to share data
✓ Generate additional revenues
✓ Add value to services provided
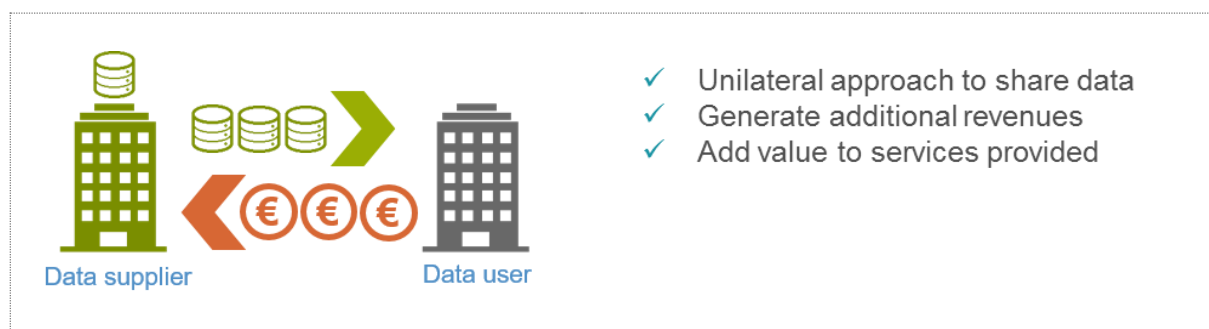
Figure 49. Main characteristics and examples of companies that follow a data monetisation approach

Data marketplaces

Data marketplaces act as **trusted intermediaries in the transaction of data**. A platform is set up to enable the exchange of data between data suppliers that wish to sell their data and data users that may be interested in purchasing the available data. Dawex is an example of a global exchange platform that brings data suppliers and data users together. In this case, the company managing the data marketplace generates revenues from each data transaction.
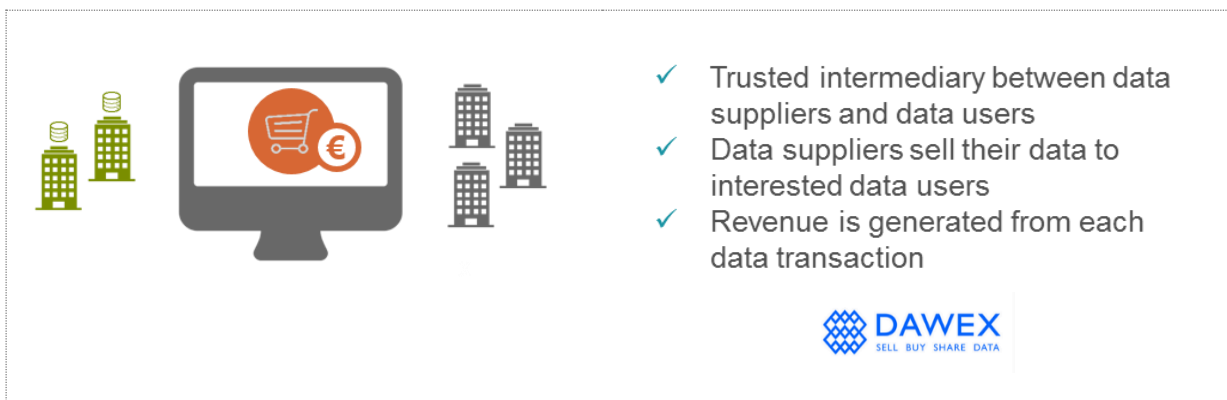
Figure 50. Main characteristics and example of a data marketplace

Industrial data platforms

Based on the insights gathered within the framework of this study, **industrial data platforms seem to be created to foster a collaborative approach to B2B data sharing**. More concretely, a restricted group of users voluntarily joins such platforms to mutually benefit from the data shared. Data are usually exchanged for free (but fees can also be considered for the provision of premium services) in a closed, exclusive and secure environment. Such platforms differ from companies that monetise their data as they do not aim at generating revenues from the data shared, but rather at enhancing their members' performance. For instance, Airbus and MAN created Skywise and RIO Platform (respectively) to ensure that their members can together improve efficiency and productivity through data from each individual company joining the platform.

Figure 51. Main characteristics and examples of industrial data platforms

Technical enablers

Within this study, it was also found another set of companies that *enable* B2B data sharing. Although they may resemble to industrial data platforms or data marketplaces, these companies can be understood as **technical enablers to data sharing between companies**. API-AGRO, DKE-Data, Nallian and Sensative developed their own web- and cloud-based solutions to enable data sharing among a group of users or business partners. These companies act as a third party in the data sharing process by providing the enabling technical solution. Contrary to industrial data platforms or data marketplaces, their revenue is achieved through the set-up, implementation and maintenance of their solutions. Data users that engage in B2B data sharing through these solutions get the opportunity to exchange data within a particular community in an agile way. Moreover, they make use of a tool that already exists and that can be customised to their needs instead of investing resources in developing something new.

Figure 52. Main characteristics and examples of technical enablers

Open data policy

Finally, **there are companies that adopt a B2B open data policy**. These companies are sometimes legally bound to make data available to third parties. They share data for free to foster the development of new products and/or services. Exceptionally, a modest payment may be requested to cover costs related to the time spent to make data available in the request format. Examples of companies that share their data for free were particularly found in the energy sector, namely Elering and Enedis.

Figure 53. Main characteristics and examples of companies that follow an open data policy

To sum up, B2B data sharing can take different forms regardless the sector in which a company operates or its size. Other factors like the motivation that drives a company to share data, or the business model selected to do so, appear to define the different approaches to B2B data sharing. The table below summarises some of the main features of B2B data sharing as reported by studied companies.

Although the present study provides evidence and examples of multiple forms to share data in business-to-business relations, it is worth noting that other approaches may already exist or may still emerge in the future.

	AIRBUS	API-AGRO	DAWEX	DKE	elering	ENEDIS	geo	here	MAN	MICHELIN	nallian	orange	SENSATIVE	Telefónica	TomTom	(last)
Founding year	1970	2013	2015	2014	2010	2008	2006	1985	1758	1889	2012	1988	2013	1924	1993	1974
Country	FR	FR	FR	DE	EE	FR	UK	DE	DE	FR	BE	ES	SE	ES	NL	NL
Size of the company	Large	Micro	Small	Micro	Med.	Large	Med.	Large	Large	Large	Micro	Large	Small	Large	Large	Micro
Sector	Smart manufacturing	Smart agriculture	Multiple sectors	Smart agriculture	Smart grids & meters	Smart grids & meters	Smart grids & meters	Data-generating driving	Data-generating driving	Data-generating driving	Multiple sectors	Telecom operators	Smart living environments	Telecom operators	Data-generating driving	Smart agriculture
Year when company started to share data/ enable data sharing	1997	2017	2015	2016	2014	2015	2009	1985	2015	1997	2012	2016	2013	2011	1993	2012
Data sharing is a main business activity	No	Yes	Yes	Yes	No	No	No	Yes	No	No	Yes	No	Yes	No	Yes	No
Data shared through APIs/SDKs	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	No
Data shared through a collaborative platform	Yes	No	No	No	Yes	Yes	No	No	Yes	No	No	No	No	No	No	No
Data is shared through an enabling solution	No	Yes	No	Yes	No	No	No	No	No	No	Yes	No	Yes	No	No	No
Data shared through a data marketplace	No	No	Yes	No	No	No	No	Yes	No	No	No	No	No	No	No	No
Data shared through other technical mechanisms	Yes	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Data shared with a wide range of users	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
Data shared with a specific group of users	Yes	No	No	No	No	No	No	Yes	No	No	Yes	Yes	No	No	Yes	No
Data are monetised	No	No	Yes	No	No	No	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes
A fee is asked for using the enabling solution	No	Yes	No	Yes	No	No	No	No	No	No	No	No	Yes	No	No	No
Data are made available for free or almost for free	Yes	Yes	No	No	Yes	Yes	No	No	Yes	No	No	No	No	No	No	No
Data are shared in exchange for a service	No	No	No	No	No	No	No	No	Yes	Yes	No	No	No	No	No	Yes

Yes +

No O

Table 11. Main features of B2B data sharing per case study

5.2. Inspiring experiences on B2B data sharing in the European Economic Area

This section briefly describes each case study to illustrate the different forms B2B data sharing can take. A detailed description of each case study can be found in annex 4.

> **❝** *Our role as a data supplier has grown out of our role as an aircraft manufacturer and as an aircraft support and service provider*
>
> Matthew Evans
> Vice-President of Digital Transformation

As a global leader in aeronautics and space-related services, **AIRBUS** has been sharing data with airlines that operate its aircrafts for about 20 years on the basis of bilateral agreements. Moreover, Airbus is legally obliged to regularly share some of its data with aviation authorities. For many years, its data sharing activity relied on basic tools such as email exchanges or CD-ROMs/DVDs. In June 2017, Airbus took a step forward with the launch of *Skywise* – a web-based platform for centralised and secure aviation data sharing. Insights shared by its customer airlines that have joined the initiative allow the aviation manufacturer to deliver enhanced aircraft and equipment designs and to improve its services. In return, participating airlines receive free regular reports on global fleet benchmarks based on data aggregated and processed by Airbus that help them to improve their performance and efficiency compared to competitors.

API-AGRO started in 2013 as a two-year research project with the aim to set up a platform enabling data sharing between agricultural stakeholders and supporting the development of a community in this field in France. Given the success of the Platform, the project has taken a step forward and evolved into a company that currently provides two types of services: match-making of data suppliers and data users in the field of agriculture, and technical, advisory and visualisation support services. The business model of API-AGRO is based on the fees they charge for the technical costs of sharing data and for the advanced support services they provide upon request. Although they are still at an early stage of development, with only a year operating as a business, they have already raised the attention of some companies at national level and beyond that are already experimenting with their datasets for concrete business uses.

> **❝** *Our platform is a concretisation of an ecosystem. We offer a tool for an ecosystem of people, who are agricultural stakeholders and especially developers.*
>
> Théo-Paul Haezebrouck
> Project Officer

DAWEX is a global data marketplace that was founded in 2015 as an independent and trusted third-party for data sharing and re-use between companies. The company started its commercial operations in 2016. Dawex is an online platform that connects companies with the end goal of selling and buying data. The primary data users of Dawex are companies operating in industries like automobile, energy, agriculture, health, or retail. The value of data is estimated by data suppliers. User-friendly technical solutions have been developed to ease the process to monetise and acquire data. Data can be shared using different formats, particularly those that can be easily accessed utilising standard entreprise software, or through Dawex API.

DKE-DATA is a start-up founded in July 2016 by 10 international agricultural machinery manufacturers. A data exchange platform, agrirouter, was co-created together with them and it will be fully operational in autumn 2018. This platform empowers farmers and agricultural contractors to exchange data generated by different machines and software applications with other interested parties in a controlled environment. Agronomic machine-generated data are transmitted through the agrirouter. Data users, which access the datasets on the basis of rules defined by farmers, include producers of seeds, food processors, machine manufacturers or app providers. Farmers and agricultural contractors can use the agrirouter for free, while app and other service providers pay a fee for using the platform based on the volume of data transferred. App providers can then charge farmers or contractors for the services offered by their apps.

ELERING is an independent electricity and gas system operator in Estonia. In 2014-2015, Elering took part in a funded project under which the proof-of-concept of Estfeed, a data exchange platform, was developed. Estfeed allows end-consumers and third parties to access energy data. It is an intermediary platform between data providers and applications from energy services that need these data. The platform went live with basic functionalities in September 2017 and the planned concept should be finalised by spring 2018. Both open and private data can be exchanged through this platform. Data are shared for free with service providers and software developers (with consent from end-consumers).

ENEDIS was founded in 2008, when it was separated from the Électricité de France Group (EDF). Enedis has been sharing data for over 20 years even while it was still part of the EDF. Enedis has therefore been sharing energy distribution and consumption data with third parties initially as part of its legal obligations, and now in accordance with its digital transformation strategy (including open data). Enedis' data have already proven to be useful for companies operating in different sectors, such as in the energy market and services, renewable energy, smart buildings and smart homes. Enedis uses its own platform to publish and make data available to third parties. APIs are used to share limited datasets with selected third parties, while web services are utilised to share large amounts of data upon requests from other companies.

GREEN ENERGY OPTIONS (geo) has been sharing data with other companies for around eight years. A simple business model was created to share data with third parties based on strong relationships and mutual trust. Data are shared against remuneration. The value of data is estimated on a case-by-case basis, depending on the use that can be made from the data. The business users of geo's data are energy and utility companies, as well as insurance firms. Different technical mechanisms are used to share data.

Sharing data has been embedded in **HERE**'s business culture since the beginning. Rapid developments in technology have created new needs and expectations from the clients, prompting the company to continuously adapt its offer. HERE maps are nowadays enriched with various datasets coming from different sources that provide highly accurate insights on traffic, road signs, incidents and facilities, to mention but a few. Data are generally sold as part of the map and business customers consume them as they use the product. In addition, HERE offers an API-enabled direct access to its datasets to interested companies. Access to data is granted against a fee that varies depending on the subscription package and usage conditions. Moreover, HERE has recently launched an Open Location Platform to support the sharing and monetisation of location data among companies. Among its top data users are the automobile industry, the transport and logistics sector, the insurance sector, advertising companies, retailers, and also the public sector. For many HERE's clients, access to location data is critical for achieving their business goals.

> *Data sharing is part of the DNA of our company. Without data, we could not offer the products we offer today.*
>
> Zahra Parvaneh
> Solution specialist at
> Here Technologies

> *RIO processes data from the transportation process, from the driver, from the vehicle, from the cargo, from the ships, the shippers, the receiver, the road. All sorts of data.*
>
> Markus Lipinsky
> Chief Digital Officer

MAN Truck & Bus, a member of the Volkswagen Truck & Bus Group, took the lead in 2015 to develop an open, cloud-based solution targeting the transport and logistics sector. The RIO platform was launched in December 2017 and is aimed at providing customers operating multi-brand fleets with a solution to their digital business needs. The RIO platform forms the basis for the connectivity services on all commercial vehicles of Volkswagen Truck & Bus' brands. This platform provides digital services to all those involved in the transport and logistics ecosystem's supply chain that are networked with each other through a standard information and application system. Vehicle and trailer operation data, contract and product/service-related data, and billing information are being exchanged through the RIO platform. Part of the services of the platform is provided for free, but premium paid services also exist. RIO's data users include start-ups, manufacturers, telematics providers, OEMs, and digital service providers.

MICHELIN is a well-known tyre manufacturer committed to enhancing its clients' sustainable mobility. In 2012, Michelin solutions was established to design, develop and commercialise data-driven solutions for professionals managing fleets of vehicles. These solutions are aimed at improving fleets' efficiency, productivity and environmental footprint. The data that feed these data-driven solutions are generated by sensors placed in the tyres and in the vehicle. Data are shared through paid service-based solutions with car manufacturers and fleet operators, but also more recently with other companies such as insurances. Michelin has also created a developer portal to allow developers to build applications and services using different APIs, including geocoding functionalities, itinerary calculations or proximity searches.

> " *We were and are working to remain at the forefront of data sharing in the travel and mobility experiences.*
>
> Louise Touze
> Public Affairs Officer

> " *Companies have so much valuable data sitting in their systems; data that can help their business partners do a better job.*
>
> Jean Verheyer
> CEO

NALLIAN was created in 2012 to help business partners in various sectors work more efficiently as a community. This is enabled by a cloud-based customisable platform that facilitates real-time data sharing in a controlled, flexible and agile environment. The users of Nallian's data sharing technology are currently logistic hubs and companies, vertical supply chains and multimodal transportation networks, but the company intends to extend the benefits of its solution to other interested sectors. Nallian uses a flat-rate model pricing for the use of its data sharing solution. General terms of use are laid down to regulate usage rights for the whole community.

As the second largest telecom operator in Spain, **ORANGE** began to experiment with the potential of its mobile data some years ago in collaboration with the Technical University of Madrid. After realising the high value of its asset, Orange decided to set up a cloud platform to store its raw data in 2016 and explore the possibility to add this platform as a new service to its offer. For that, Orange partnered with selected technology companies that can access and treat its anonymised and aggregated data directly on the cloud to extract insights that help their business clients to improve their performance and make better decisions. The data made available through the platform are call detail records (e.g. date, time, duration or cost), anonymised socio-demographic data of their mobile customers, and network data. The transport, retail, marketing and tourism industries are the main clients of this service.

> *Mobile operator data, combined with socio-demographic information, is the most trustworthy dataset for geo-location available in the market.*
>
> Benedicte Pluquin
> Business Developer
> Big Data – Orange
> Spain

> *We have been developing this middleware data platform and the whole purpose is to share data between different users and different services connecting to the same infrastructure, the same sensors, same devices in a building.*
>
> Mats Pettersson
> CEO at Sensative

SENSATIVE AB is a Swedish start-up founded in 2013 which has built its reputation on the development and provision of smart sensors. In 2017, the company released Yggio, a platform to create a standardised digital interface for multi-residential property services of IoT devices. Yggio also allows the devices to be used by multiple users and services via the platform's Application Programming Interfaces. The main goals of Yggio are to create benefits for real estate companies that own properties in the form of lower investment costs, avoid lock-in effects caused by proprietary solutions, foster "ownership" of the generated data by real estate owners or tenants, and help develop more powerful and cost-effective services. Sensative AB charges a fee for making use of Yggio instead of paying for the actual data shared.

TELEFONICA has always had a lot of data. Initially, data were essential for internal operations' development and improvement. The journey of moving from this internal use towards benefiting end-consumers, companies and society began with the formation of Telefónica Digital in 2011. In 2016, a dedicated data insights unit, LUCA, was formed to help companies make better decisions using anonymised mobile data (e.g. crowd movements). The licensing agreements are comprehensive and tailored to the specific insights that companies are seeking, whilst ensuring that usage rights are narrowly defined and that the data source's privacy is protected. These insights are shared through secure Application Programming Interfaces (APIs), sometimes in exchange for a fee. The main business data users of Telefónica's insights operate in media and advertising, financial services, retail, tourism, and transport.

> *We forge partnerships with our clients to help them solve evolving problems and provide data insights to solve next month's or next year's problem.*
>
> John Foster
> Chief Data Officer

> *It is not about the data itself, but about what can be done with it in terms of user benefit.*
>
> Peter-Frans Pauwels
> Co-founder

TOMTOM has been sharing data with other companies for more than 25 years. A unilateral business model was created to share data with third parties. Comprehensive licensing agreements define usage rights, but also restrictions to re-use data. Data are shared against remuneration. The value of data are estimated based on the features of the data to be shared, but also on the use that will be made from the data. The main business users of TomTom's data are original equipment manufacturers (OEMs), large vendors, technology companies, and geographical information system (GIS) providers. Application Programming Interfaces (APIs) are used because they have proven to be one of the safest and fastest technical mechanisms to share data. They also allow for metering and monitoring how data are used and for swift intervention in cases of misappropriation or misuse of data.

Jacob Van Den Borne and his brother Jan own a third generation farm in the southern part of the Netherlands, **VAN DEN BORNE AARDAPPELEN**, and they are specialised in the cultivation of potatoes using precision farming techniques. They started sharing their data with research institutions for free back in 2010, and only recently they have started selling their data and data-derived services to agrochemical and seed companies. This has allowed them to monetise datasets that were initially being collected for improving their own farm performance. Aware of the potential of data as an additional revenue source, they are now actively looking for new models to monetise their data by showing the higher customer value of crops that come with data.

> *If my farming data can prove that I am a craftsman, then my customers are willing to pay me more.*
>
> Jacob van den Bornen
> Farm co-owner

6. Obstacles to data sharing and re-use between companies in the European Economic Area

This chapter describes the obstacles to data sharing and re-use between companies. The results of the survey undertaken within the framework of this study are put into relation with the information gathered through the interviews with selected companies already engaged in B2B data sharing, as well as with the insights collected during the webinars. These findings are intended to build on and deepen the results from previous studies as reported in chapter 3.

6.1. Obstacles to data sharing

Out of the 129 respondents that answered the survey, **50 companies claimed to share data with other companies**. This accounts for 39 % of the total number of respondents.

Out of the 50 companies that claimed to share data in business-to-business relations, 52 % reported to have experienced obstacles while doing so, as shown in the figure below.
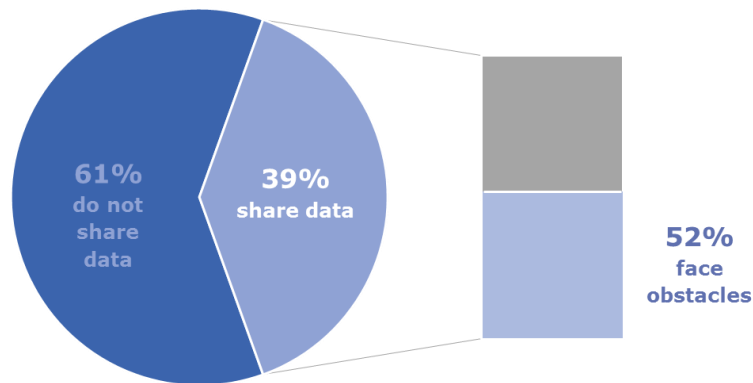
Figure 54. Companies engaged in B2B data sharing and experiencing obstacles

According to the survey's results, the main barriers to B2B data sharing include **technical obstacles** and related costs (73 %), as well as **legal uncertainty** regarding "data ownership rights" (54 %). The figure below shows the relative weight of the obstacles to data sharing as declared by the companies that participated in the survey. Each company was allowed to indicate a maximum of four obstacles.
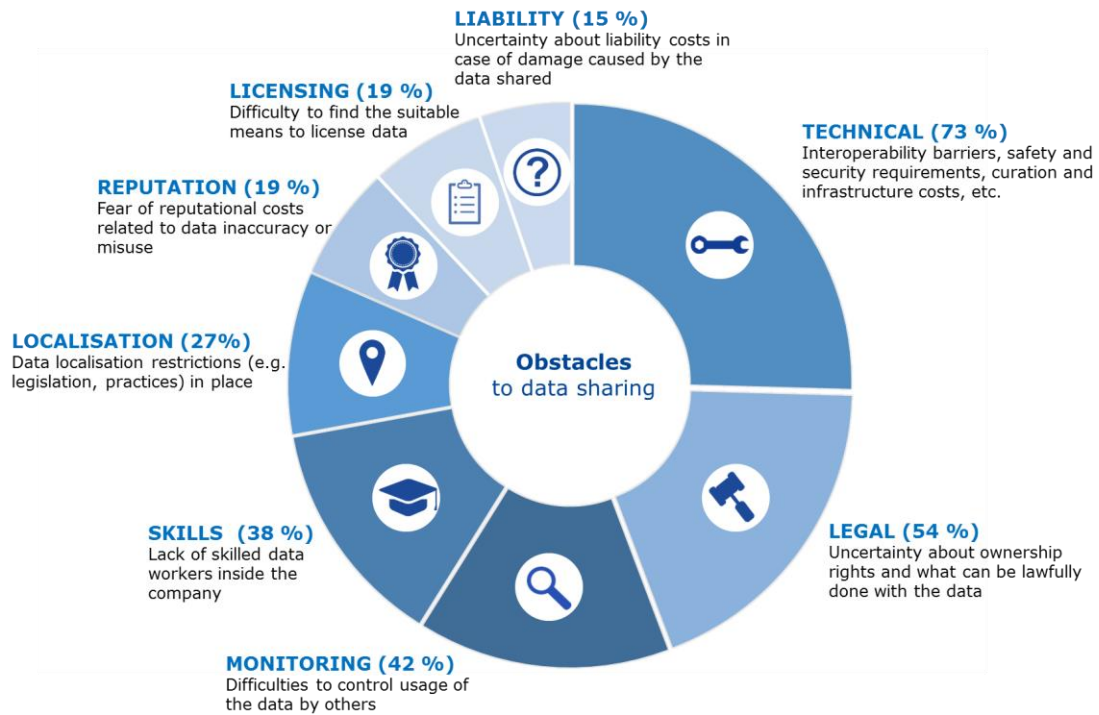
Figure 55. Obstacles to data sharing according to the survey results

A detailed analysis of the obstacles to data sharing between companies is provided below. Although the survey results provide an indication about the main obstacles faced by companies engaged in B2B data sharing, insights gathered through the interviews and webinars are described hereafter to complement these findings. This analysis is also compared with information described in previous studies (see chapter 3).

6.1.1. Technical obstacles

Technical obstacles and related costs stand out as the main obstacles faced by the majority of the companies that engage in B2B data sharing (73 % of survey respondents). These obstacles have also been referred to by several companies interviewed as part of the case studies. They are broken down in various sub-types as detailed below.

Technical limitations in relation to data stocking and to the **ability to process and keep up-to-date large volumes of data**, as well as their associated costs, have been pointed out by TomTom as limiting obstacles to data sharing that prevailed until very recently.

Lack of data standardisation and interoperability was also a significant challenge experienced by Airbus, Enedis, geo, HERE, Telefónica and van den Borne. These companies were confronted with different data formats and systems of data storage, making it difficult and costly for them to combine the available datasets and be able to

extract their value efficiently. This confirms the findings of a recent study[133], which identified the lack of interoperability standards as either a blocking factor or as a very important or considerable barrier to data sharing. This finding also confirms the information collected from the European Commission's public consultation on the European data economy[134].

Infrastructure costs linked to storage were also a key consideration for Orange before deciding to engage in B2B data sharing, as well as the ability to ensure high security standards. Recent literature[135] supports this finding arguing that the costs of data sharing (which also encompass infrastructure costs) matter and can have an impact on the decision of data suppliers to make their datasets available to others. In the case of Orange, the choice of a cloud-based platform helped them to reduce infrastructure costs by getting a pay-by-use solution (instead of having to incur into structural costs upfront) that, at the same time, guarantees data security. At the same time, using a cloud-based platform was a challenge for them as some of their partners because were not familiar with this technology.

Poor or insufficient quality of the data was further mentioned as an obstacle to data sharing by some companies during the interviews or at the webinars. Enedis reported, for instance, that the granularity of data they hold sometimes does not meet the demand of data users. As the latter require finer granularity, Enedis cannot ensure sufficient quality standards and, therefore, decides for not sharing such data.

The **high complexity of the architecture of platforms** used for sharing data may also constitute an obstacle. As mentioned by Elering, the complex architecture of their platform may limit its full exploitation by companies that may not have the required IT skills to implement certain solutions. User manuals are being developed though to overcome this obstacle.

Lastly, some companies pointed to a **lack of trust linked to technical solutions** that may explain data suppliers' reluctance to share their data. API-AGRO noted, for instance, that some data suppliers are mistrustful regarding the security standards of servers and platforms not owned by them. This is why API-AGRO offers data suppliers the possibility to use their own API to share their data directly from their servers. Sensative AB, on the other hand, recognised that it is essential to assure data quality to generate trust among data users. Not being able to do so can actually be an obstacle to data sharing. Therefore, Sensative AB set up an evaluation system on their platform so that data users can assess the quality of the data accessed.

6.1.2. Legal obstacles and related concerns

A second main obstacle to data sharing reported by the survey respondents (54 %) is the **legal uncertainty regarding "data ownership rights"** and/or what can be lawfully done with the datasets (namely the usage of data). At the same time, **difficulties to track down and have control on the usage of the shared data** were also

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[133] Deloitte and Openforum Europe, *op.cit*., pp. 40-41 and 50.
[134] European Commission (2017), "Annex to the Synopsis report: Detailed analysis of the public online consultation results on Building a European Data Economy", *op.cit.,* p.42.
[135] Ibid., p. 15.

highlighted in the survey (42 %). Both obstacles were also acknowledged as deterrents to B2B data sharing by some of the companies interviewed, including HERE, Michelin, TomTom and van den Borne. Although API-AGRO and Dawex do not hold "ownership rights" over the data exchanged through their platforms, they also referred to these obstacles based on the experiences and feedback from their customers. These findings are again in line with recent literature[136].

Besides the legal concerns about "data ownership", difficulties in understanding and/or meeting the **legal requirements on data protection** in B2B data sharing were also highlighted by Elering, Enedis, MAN, Michelin and Orange. According to the interviewees, there still remains a certain degree of uncertainty with regard to the type of data that can be shared. At the same time, meeting data protection requirements can result in additional costs for the company to ensure anonymisation and aggregation. Lack of knowledge and clarity about the specificities and possible restrictions of the new EU rules on data protection and privacy were also echoed as potential legal obstacles to data sharing by the participants at the webinars.

Data localisation restrictions were also identified as an obstacle in the survey (27 %). Recent literature corroborates this finding[137,138] as discussed in chapter 3. In addition, TomTom particularly reported existing regulatory restrictions in Asian countries that limit its ability to collect and share or sell map data in these markets.

6.1.3. Lack of skills

Although the **lack of skilled data workers** inside a company was highlighted as a relevant obstacle to data sharing in the survey (38 %), this issue was only raised as a serious concern by one of the companies interviewed. Van den Borne pointed to their lack of data skills and the ability to manipulate and make sense of the data they held as a key obstacle at the onset of their data sharing experience. According to the interviewee, the lack of data skills in-house led to losing two years of data collection efforts due to data mismanagement. Partnerships with several universities have been helping Van den Borne to attract students with data skills to curate and analyse the data they hold.

6.1.4. Other obstacles to data sharing

Fear of reputational costs for the company due to data inaccuracy or misuse and difficulty in finding the appropriate means to license data usage are obstacles that appear to affect nearly one in five businesses (19 %). Additionally, API-AGRO, Airbus and van den Borne referred to other related deterrents, such as the **uncertainty about suitable licensing contracts** to be used and for which cases, or the **cumbersome and costly process of preparing and tailoring licensing agreements** to each client. Contractual uncertainty

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[136] Deloitte and Openforum Europe, *op.cit*., pp. 15 and 40.
[137] European Commission (2017), "Annex to the Synopsis report: Detailed analysis of the public online consultation results on Building a European Data Economy", *op.cit*., p.3.
[138] BusinessEurope and Noerr, *op.cit*., p. 14.

was also identified as an important inhibiting factor of data sharing in another study recently undertaken[139].

Uncertainty about liability costs in case of damage caused by the data shared was reported by 15 % of the surveyed companies as an obstacle to data sharing.

Both the interviews and the webinars allowed for the identification of additional obstacles, including:

- **Limited financial resources**: companies need to make initial and continuous economic investments to pursue their data sharing activities. As mentioned by Dawex and Orange, limited financial resources can be an obstacle either to scale up data sharing technical solutions, or to be able to invest in marketing to become known amongst potential data users.

- **Lack of understanding about the potential of data**: data users do not seem to understand the potential of data unless they see how datasets can be beneficial for their business. This can make data monetisation a complex task. Both Orange and Telefónica invest time in engaging with data users to show how data can help them to develop or improve products and/or services, or to increase efficiency, and thereby generating additional revenue. Van den Borne, on the other hand, is developing a manual to explain to data users how each dataset can be used and applied to concrete use cases.

6.2. Obstacles to data re-use

Out of the 129 companies that answered the survey, 54 are re-using data from other companies (42 %). Out of these 54, **59 % companies reported to have experienced obstacles to data re-use** as shown in the figure below.
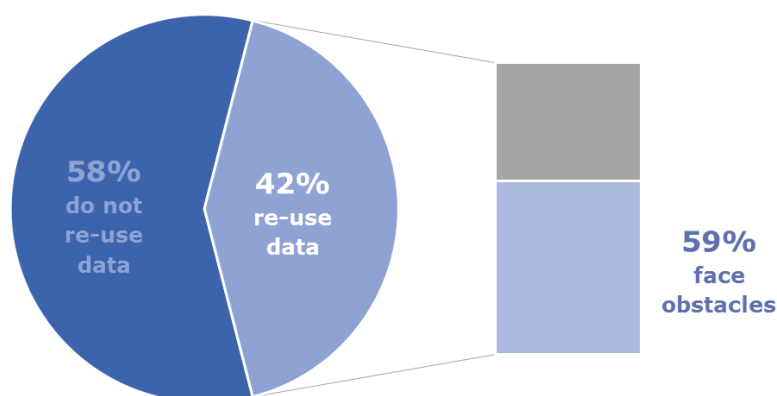
Figure 56. Companies re-using data and experiencing obstacles

The figure below summarises the obstacles to data re-use in business-to-business relations faced by the companies that claimed to be data users in the survey. The relative weight of each of these obstacles is also represented in the figure based on the number

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[139] Ibid., p. 15 and 40.

of companies that reported them. Companies were allowed to indicate a maximum of three obstacles.
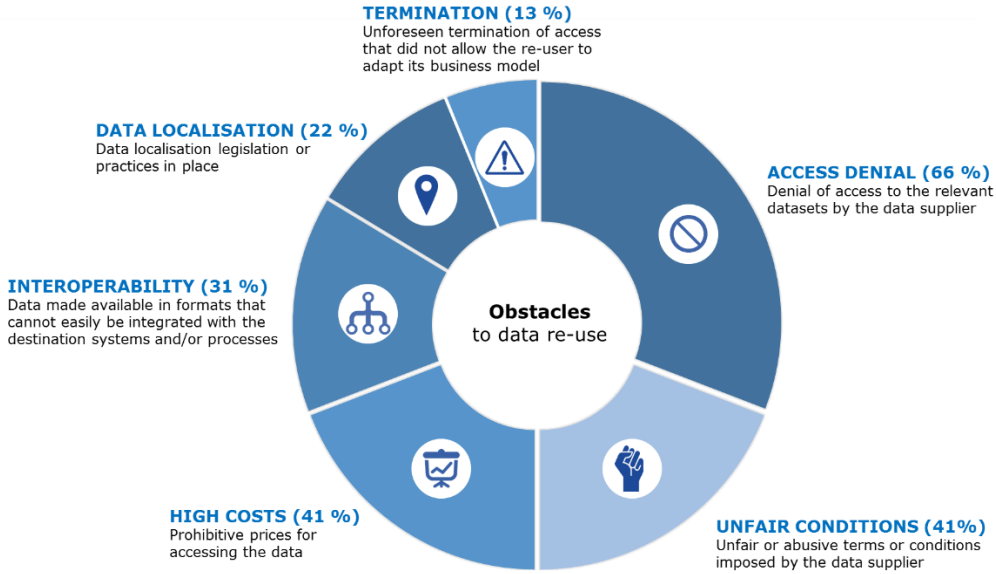
Figure 57. Obstacles to data re-use according to the survey results

An analysis of the obstacles to data re-use between companies is provided below. As the interviews undertaken within the framework of this study focused solely on B2B data sharing, there are fewer insights that can add to the survey results[140]. Nevertheless, the analysis that follows is complemented by information included in previous studies (see chapter 3).

6.2.1.   Denial of access to relevant datasets

A recurring obstacle faced by 66 % of the surveyed companies relates to the **denial of access to relevant datasets**. The study did not seek to obtain a break-down of the reasons for denial of access to data. It is highly probable that certain data suppliers have legitimate reasons to deny access to their data. In addition, certain features of data may not be deliberately made available to other parties to comply with relevant legislation and/or to protect private individuals. For example, TomTom's licensing agreements restrict access to actual speed data of drivers.

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[140] While the focus of both the case studies and the webinars was on the supply side of data sharing, a few comments on the obstacles faced by the demand side, namely by data users, also emerged from the discussions. This is either due to the fact that several of the companies that are sharing data are simultaneously re-using data made available by others, or to the very nature of some of the companies interviewed as data sharing intermediaries or enablers, which puts them in a good position to understand the obstacles faced by the users of their platforms.

6.2.2. Discriminating and costly conditions to access data from other companies

Unfair or abusive terms or conditions imposed by the data supplier and prohibitive prices for accessing the data came as the second most common obstacles on equal footing (41 %). **Unfair or abusive terms to access data** have been mentioned by van den Borne as a key obstacle across the agricultural sector. Big equipment manufacturers that sell their machines to farmers appear to impose their own conditions as regards usage of the data collected through their devices. This seems to limit the ability of farmers to generate value out of the data generated by these machines. Concerns about such type of power abuse regarding quantity, quality, format, costs or contractual conditions regarding data re-use were also raised in the survey by companies in the after-market automotive industry with regard to original equipment manufacturers (OEMs).

Previous studies corroborate these findings by referring to unequal bargaining power and abuse of dominant position by data suppliers regarding conditions and restrictions to data access[141]. Prohibitive prices for accessing data were not specifically raised as an obstacle to data re-using either during the interviews or at the webinars. However, prior literature also identified prohibitive prices as obstacles faced by data users[142].

6.2.3. Lack of interoperability and standardisation

Some companies claimed to have experienced problems in accessing data in the desired format as an obstacle to data re-use in the survey (31 %). **Interoperability issues** were also mentioned in the case studies by companies like Airbus with regard to both the data generated internally, as well as the data provided to them by the airlines that purchase their aircrafts. **Lack of standardisation of data** was mentioned by HERE as an important impediment to data re-use. According to this company, the lack of data standardisation specifically results in high curation costs for data users. Indeed, this supports the findings of recent literature, which points to interoperability and the establishment of standards as crucial prerequisites for data exchange to happen effectively and at a low cost[143].

6.2.4. Other obstacles to data re-use

Data localisation measures and an **unforeseen termination of data access** by the data supplier were found to be the least significant obstacles to data re-use (reported respectively by 22 % and 13 % of companies that claimed to re-use data in the survey).

In addition to the obstacles suggested in the survey and others discussed above, a **lack of sufficient data skills** by data users was stressed as a potential deterrent to data re-use. This obstacle was mentioned by API-AGRO (that acts as a data sharing intermediary), but also by Elering, in particular as regards the use of their complex data platform.

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[141] Deloitte and Openforum Europe, *op.cit.*, p.7 and "Annex to the synopsis report", *op. cit.*, p. 13.
[142] "Annex to the synopsis report", Ibid.
[143] Ibid., p.94.

7. Success factors for data sharing between companies in the European Economic Area

This chapter describes the factors that enabled companies to make B2B data sharing a successful activity[144]. The analysis that follows builds mainly on the insights gathered from the interviews and the webinars. The findings are further complemented with the information collected via the survey[145]. Whenever available, insights from recent literature are also discussed to work further up the study findings.

Bulding trust among data suppliers and users, joining forces with partners that can bring in complementary skills and assets, or understanding the data demand stand out as the main success factors according to companies already engaged in B2B data sharing. The full set of success factors are summarised in the figure below. They are analysed separately and in more detail in the sections that follow.

Building trust
Understanding how the data will be used and the purposes, ensuring control and the security standards of the sharing mechanisms will help

Understanding the data demand
Having a good understanding of the sector(s) interested in the data and identifying concrete use cases

Partnership
Partnering with companies or research organisations with complementary skills to reduce innovation costs, develop internal skills or better understand the target sectors

A defined legal framework
Having a clear legal framework for data processing and usage and applying its principles
.

Success factors for data sharing

Simplicity and user-friendliness
Using simple and easy to use mechanisms for making the data available in the desired format(s)

Figure 58. Success factors for B2B data sharing

7.1. Trust between data suppliers and data users

Building trust with data users and suppliers was identified as a major success factor by a significant number of the companies interviewed (API-AGRO, Dawex, Enedis, geo, HERE and Telefónica). Each company explained how trust is being built with data users and suppliers. The different visions and ways to successfully build trust are further described hereafter.

Trust is built by ensuring **high security levels** in the technical mechanisms used for sharing data (API-AGRO, Dawex, HERE and geo)e). In the specific case of data marketplaces and technical enablers, both Dawex and API-AGRO consider that trust is gained by **empowering data suppliers and giving them full control over their datasets** and which companies they wish to share their data with.

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[144] Considering that the fieldwork focused mainly on the data sharing dimension and that the feedback received through the survey was limited, solid conclusions could not be drawn regarding the success factors for data re-use.

[145] Of the 50 companies that claimed to be engaged in B2B data sharing in the survey, 24 provided information about the factors that helped them to successfully share data with other companies via a free text field available in the survey questionnaire.

Trust is also built by **enabling the communication between data suppliers and users** and by ensuring that only trusted and real companies take part in the data exchange (API-AGRO and Dawex). For that, both API-AGRO and Dawex ask companies that wish to use their platforms to register first and provide information about themselves. According to API-AGRO, data suppliers are reassured about making their datasets available if they understand what will be ultimately done with their data.

A **close collaboration with data users** to identify concrete use cases and/or ensure win-win benefits for both data suppliers and data users is further mentioned by Airbus and geo as a successful way to build trust. Helping data users to understand the benefits of data and supporting them in making use of the datasets is also highlighted as a positive factor to enable data sharing by Telefónica.

Putting together comprehensive **licensing agreements** outlining data usage conditions and restrictions has also proven to be an important factor for Michelin to build trust with the users of its data.

Explaining to data users that the data a company holds can be legally shared is also key in building this trusted relationship. As stated by geo and HERE, it is essential to clarify that they obtained the permission to share data with third parties from the private individuals.

Lastly, **enabling direct contacts** between data suppliers and users is also highlighted as a positive factor towards building trust and thus fostering data sharing. This is the reason why API-AGRO regularly organise meetings and networking events where data suppliers and users can meet beyond virtual communication.

7.2. Clear understanding of the data demand

Understanding well the sectors with potential interest in the data was mentioned as a success factor by a few companies in the survey, but also by the companies interviewed. This allows for the **identification of concrete use cases** for the data a company holds as signalled by several of the companies interviewed, including Airbus, Orange, Telefónica, TomTom and van den Borne. In this context, use cases are understood as examples of the different uses that can be made out of the data that the data supplier holds. Use cases help potential data users understand how accessing data from a certain company may benefit their own business. Establishing concrete use cases also support data suppliers to define the value of their datasets.

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Engaging directly with potential data users to understand their challenges and business needs and find how data can add value to them is crucial for understanding the data demand. This was noted by Airbus, Enedis, geo, MAN, Orange, Telefónica and TomTom. Orange and Telefónica discuss individually with potential data users their challenges and needs to be able to ascertain which data can best help data users to address these issues. The farmer van den Borne engages with the companies that purchase its potatoes to show how the data he collects can bring an added value to its main commodity. Having a good understanding of the business ecosystem was also highlighted as a success factor by Sensative AB. In their case, this was enabled through their prior experience in similar industries. In line with understanding the demand for data is the **ability to react to the data demand in an agile and flexible way**. This was reported by Orange as a key success factor for them.

7.3. Partnerships

Establishing partnerships with other companies or other third parties (such as research organisations or associations) with complementary skills was also mentioned by several companies as a key factor to their data sharing success (Airbus, Sensative, Orange, HERE, MAN and van den Borne). In this context, partnerships are understood as a strategic collaboration between a company that decides to engage in B2B data sharing (either as a data supplier, or a leader of an industrial data platform) and a third party that has competences that will boost this company's data sharing activity. This partnership may encompass a formal contractual relationship, or may be established in exchange of services or benefits. More concretely, **partnerships helped companies to**:

- Set up the right technical mechanisms for making their data available in an efficient and secure way, which resulted in making important savings in terms of technology investments

- Enable a better understanding of the data users' needs

- Jointly develop products or services using the data shared

- Build the necessary skills inside the company

- Raise funds for setting up their data sharing activity

7.4. Simplicity and user-friendliness

Several companies that were interviewed, particularly Airbus, API-AGRO Dawex, emphasised that **putting in place simple and user-friendly mechanisms** for exchanging data in a suitable format is critical to enable B2B data sharing. These companies also **offer IT support and/or accessible tools** to help data users make sense of the data and be able re-use them in an efficient way. **Making access to data easy** was also stressed as a success factor by companies that filled in the survey. The

use of APIs (or SDKs[146]) and visualisation tools were mentioned as useful instruments that enhance the data sharing experience.

Another aspect that helped geo particularly to successfully share data was the use of **simple data licensing requirements** so that their data users easily understand what they can get out of geo's data.

7.5. Enabling legal and policy frameworks

Companies highlighted the importance of a clear legal framework in particular in relation to personal data protection and intellectual property. Such legal framework helps them by providing certainty and predictability as to what can be lawfully done with the data they hold, under which conditions they can make data available to others, and how obligations can be enforced in case of data misuse. This was particularly pointed out by TomTom. At the same time, sector-specific laws and data sharing obligations in the field of energy helped Elering and Sensative to make a strong case for their platforms for data sharing.

While appreciating the efforts made by the Commission to work towards a Digital Single Market and ensure the free flow of data in Europe, TomTom highlighted that already the Single Market was an important initiative enabling its data sharing activity. The removal of internal borders related to the free movement of goods and services have been essential to be able collect data to build their maps, as well as to share data with other companies.

7.6. Other success factors

A critical factor for Airbus' positive and successful experience with data sharing is the **ability to create a sense of clear win-win benefits** for all stakeholders involved. This gives an incentive to data users to simultaneously become data suppliers in exchange for global benchmarks that can help them to improve their performance.

Having the right **funding capabilities** in place or receiving financial support from third parties at the beginning of their data sharing experience was mentioned as a success factor by Dawex, geo and Sensative.

For van den Borne, **exchanging experiences and sharing knowledge** with others is the cornerstone of its data sharing activity. The two brothers entered the world of precision farming with no prior experience. Their know-how was created by visiting farms that were already experimenting with data-driven business models. Today they are passing on their knowledge and know-how to interested farmers to foster precision farming and, consequently, B2B data sharing.

Lastly, **being a first-mover** as a data marketplace in Europe was a key success factor for Dawex, as it positioned the company at a time where such a space for global exchange of data across sectors did not exist in Europe.

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[146] IDC (2017), "Technical obstacles to data sharing in Europe", *op.cit*., p. 21 and also European Commission (2017), "Annex to the synopsis report", *op.cit*., p. 19.

8. Lessons learnt from companies about B2B data sharing

Several lessons could be drawn about data sharing in business-to-business relations based on the insights gathered within the framework of this study. These lessons reflect the experiences of the companies interviewed and are summarised below taking into account considerations of type of business model and/or sector of activity, whenever relevant.

As explained by many companies, before engaging in B2B data sharing, **a company should be able to assess how its data can be relevant to others**. This a common lesson found across companies that engage in data sharing in order to monetise their data following a unilateral approach, but also those that approach data sharing as a collaborative effort that can yield mutual benefits to companies in a particular sector. Indeed, understanding the potential demand for data and identifying concrete use cases can help to put a value to the datasets, which is particularly important for those companies that seek to monetise their datasets. On the other hand, understanding the relevance of data can help companies to find ways to cooperate and leverage from each other's data. Finally, this also holds true for the instrumental enablers as understanding the demand for data allows them to design a technical solution that can effectively work for the companies that use it.

Closely linked to the previous lesson is the need for **regular engagement with data users to stay informed about their business requirements**. This can help data suppliers to better understand how their data can add value to other companies' business activities, namely by supporting the development of new products and/or services or by improving the performance or the efficiency of their processes. For that, addressing users 'in their own language' (i.e. explaining them how data can be used to solve their questions and needs) and raising awareness about the benefits of data is crucial for all players engaged in B2B data sharing. For instance, while companies interested in monetising their data need to make potential data users aware of their data, other companies that lead industrial data platforms need to sensitise others to the mutual benefits of sharing and re-using data from a closed circle of companies. In addition to raising awareness about data and respective benefits, identifying use cases in partnership with data users has proven to be useful to help suppliers to estimate the value of their data. This lesson was particularly suggested by data suppliers that monetise their data, but it was also supported by proponents of collaborative platforms.

A third lesson learnt is to **establish partnerships with other third parties that have complementary skills**. Such partnerships can make up for internal skills' gaps and help a company (or a group of companies) to save time and money, in particular at the beginning of setting up a data sharing activity. For instance, partnering with a technology-savvy company can significantly reduce the initial investment by adapting one of their technical solutions to enable data exchange instead of developing a new one in-house. Partnerships can also enable the development of internal skills and/or the possibility to co-develop new products and/or services using the data shared. For example, establishing a partnership with a university can bring data skills to a company,

or partnering with companies that hold complementary data can help develop an innovative product that draws on multiple data sources. This is a lesson put forward by data suppliers (in this case, companies interested in monetising their data), but also shared by industrial data platforms.

Opting for **simplicity** was highlighted as a key lesson learnt by several companies regardless their business model or the sector in which they operate. Simplicity may encompass: laying down simple licensing agreements (using, for instance, general terms of use or standard licensing conditions that can be later customised depending on the data user); putting in place technical mechanisms that ease the access to and the transfer of data (e.g. using APIs); or even developing business models that can be easily understood by data users (e.g. applying a fixed data charge).

Building trust appears to be essential both for companies interested in monetising their data, but also for other players in the B2B data sharing ecosystem. Whereas for data marketplaces building trust and creating secure conditions for sharing are critical in order to attract data suppliers and users to a data sharing platform, for data suppliers that seek to monetise their data building trust can help to counter the risks associated with sharing data. These risks include data breaches or the misuse or abuse of the data shared.

Another lesson learnt from the companies studied is the need to **understand well the legal framework** and what can be lawfully done with the data. While large companies tend to have dedicated legal departments, this is not always the case for smaller companies with less resources. Yet, even larger companies find it sometimes challenging to keep abreast of the various legal rules that govern data collection and governance, the obligations they lay down and the concrete implications for their business. Companies that can demonstrate a solid understanding about relevant legislation may be able to generate trust among data users. Being perceived as having this solid understanding and actively informing data users about the legal measures implemented in order to ensure compliance with relevant laws appears to be a key factor.

Ensuring **sufficient financial resources** is vital to kick-start data sharing, but also to be able to pursue this activity. For example, technical mechanisms need to be further developed and maintained. Moreover, funds are also needed to continuously promote the data offer.

Additional lessons could be learnt from the companies that accepted to participate in this study, but appear to be applicable only to some of them.

Some lessons seem to be specific to data suppliers engaged in a unilateral data sharing business model (i.e. data monetisation). For instance, **having clear licensing agreements** in place laying down data usage rights and eventual restrictions has helped companies to establish clear and successful relationships with data users, while making data suppliers more confident about giving access to their datasets. At the same time, ensuring that data sharing can be a **sustainable activity** for the company throughout time is important to be able to recover the investments made.

Lastly, a lesson was mentioned as being specific to one of the sectors examined in this study. For Telecom operators, **being able to offer data in an agile way** (namely that

data can be provided to data users in a swift way) is fundamental to be able to compete with and differentiate from other mobile operators.

To sum up, eight key lessons can be drawn from the experiences shared by the companies that participated in this study. These are listed in the figure below (in no particular order).

8 lessons about B2B data sharing in Europe

Assess how your data can add value to others

Understanding the demand for your data and how data can add value to other companies. This will help you to identify use case and estimate the value of your data.

#1

Engage with data users to understand their needs

Engaging with data users will help you to better understand their business' challenges and needs and make your data offer (or services) more relevant.

#2

Establish partnerships to complement your skills

Joining forces with others can complement your skills and reduce your initial investment. It can also provide better insights about data demand and/or support your innovation capacity.

#3

Make simplicity a rule in your model

Using user-friendly platforms and solutions and standard licensing agreements that can be easily customised as needed and will foster data sharing and re-use.

#4

Understand well the legal framework

Understanding well what can be done with the data in accordance with the legal setting and what the restrictions are for sharing the data you hold.

#5

Set up clear licensing agreements

Outlining clear usage rights and restrictions will contribute to successful relationships between data suppliers and users and clarify eventual liabilities.

#6

Make sure that data sharing is sustainable

Embedding data sharing to the company's model and ensuring a continuous demand for the data is fundamental to recover investments and make data sharing a long-lasting activity for a company.

#7

Ensure sufficient financial resources

Ensuring the availability of funds is important both for kick-starting the data sharing activity and for further developing current or new solutions that ensure easy and secure data exchanges

#8

Figure 59. Key lessons about B2B data sharing

9. Main conclusions

This chapter summarises the main conclusions from the preceding sections. All insights gathered in this study have contributed to an improved understanding of the challenges faced and opportunities emerging from B2B sharing and re-use. In light of the findings from the present study, the characteristics of the current B2B data sharing ecosystem are discussed. Finally, this chapter outlines suggestions for future research.

There is substantial evidence that companies headquartered in the European Economic Area share and re-use data among them

The findings from the present study, from recent research[147] and from the public consultation organised by the European Commission in early 2017[148] clearly show that companies are sharing and re-using data in business-to-business relations in Europe. This study found that nearly four in 10 companies are sharing some of their data, and that about 20 % of these companies are sharing data as a main economic activity. Also about four in 10 companies re-use data from other companies, and a large portion of them consider it as very important for their business. These findings confirm a trend already identified in the European Commission's public consultation on 'Building a European Data Economy', in which one third of respondents (including mainly businesses and associations) declared to share some of their data, and more than half of respondents reported to depend on data from third parties to achieve their business goals. These findings may suggest that companies in the European Economic Area recognise the benefits of engaging in B2B data sharing and re-use to pursue their business. Despite these encouraging insights, it is possible to understand that data sharing still remains rather uncommon. A recent study[149], which surveyed 100 companies, concluded that only 11 %[150] were trading data in business-to-business relations, and 2 % had adopted an open data policy to share data.

Companies engage in B2B data sharing and re-use to enhance their business productivity

Based on the findings of the survey carried out within the framework of this study, companies share and re-use data among them to explore the possibility of developing new products and services and/or new business models. The fieldwork has provided more in-depth insights in relation to the reasons that drive companies to engage in B2B data sharing. While some aim at generating more revenues through the monetisation of their

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[147] Deloitte and Openforum Europe, Impact Assessment support study on emerging issues of data ownership, interoperability, (re)usability and access to data, and liability, fourth interim report, 2017 (unpublished manuscript)

[148] European Commission (2017), "Annex to the Synopsis report: Detailed analysis of the public online consultation results on Building a European Data Economy", 7.9.2017

[149] Deloitte, Impact assessment support study on emerging issues of data ownership, interoperability, (re)usability and access to data and liability. First interim report (forthcoming) *in* European Commission (2017), Staff working document on the free flow of data and emerging issues of the European data economy accompanying the Communication "Building a European data economy" (SWD(2017) 2 final), p. 16

[150] This figure corresponds to the percentage of companies that share data according to the following models defined in Deloitte's study: innovation space (1 %), partnership (4 %), joint venture (2 %), and data reselling (4 %).

data, others share data to foster a strategic and mutually beneficial alliance with other companies.

The number of data suppliers and users is expected to grow in the next five years

The literature review undertaken shows that in spite of its big potential in terms of business opportunities and growth, the European Data Market is still in its infancy. While the value of the EU data market was estimated at EUR 60 billion in 2016 and it is growing at a fast pace, the companies that are intense data users account only for 6.3 % of the potential companies in Europe, and they are concentrated in a number of sectors. At the same time, the present study collected insights from 129 companies that voluntarily participated in the survey, of which 39 % declared to share data with other companies. Although less than a quarter of these companies consider data sharing as their main economic activity at present, the percentage of data suppliers sharing data as their primary activity is expected to double in five years' time. Simultaneously, one third of the companies that are not yet engaged in B2B data sharing see a possibility for starting sharing data with other companies within the next five years. Similarly to the data supply side, 42 % of the 129 respondents claimed to re-use data from other companies. The majority of data users consider that accessing data from data suppliers is important to their business. Almost half of the companies that have never re-used data see a possibility for engaging in B2B data re-use within the next five years.

Although there is a growing interest in B2B data sharing, there is not a common understanding of the concept

Even though companies have been sharing and re-using data among them for many years and that an exponential growth is expected, the concept of 'B2B data sharing' is not commonly understood. Moreover, in some cases, the concept is regarded with suspicion and misinterpreted. Indeed, the different elements of data sharing make it a complex concept which is difficult to define. Finally, the fact that data sharing and re-use have been interchangeably referred to as 'data access and transfer' in policy documents may have also contributed to a broader misunderstanding about the concept.

The present study allowed for a better understanding of the concept and the various dimensions that are encompassed in B2B data sharing and re-use. B2B data sharing does not mean giving away complete datasets, or losing "data ownership" rights. Data suppliers and data users are a central part of the ecosystem, but third parties may be involved in the process, either as intermediaries or as enablers. Finally, data suppliers have the power to decide whether their data will be monetised, exchanged at little cost or against the provision of a service, or made available for free.

There are different players in the data economy ecosystem

The data economy ecosystem can be rather complex considering its cross-border and inter-sectorial nature. Companies headquartered in different countries and operating in

distinct sectors exchange data among them under specific conditions. Data suppliers and data users are key players in this ecosystem. *Data suppliers* make datasets available to interested data users in compliance with relevant laws. This means that they hold "ownership"-type of rights over data and/or have obtained legal permission from private individuals to share their data. *Data users* access data from data suppliers following the conditions set up and agreed on between them. Companies may play a dual role in this ecosystem, i.e. they are both data suppliers and data users. In certain cases, companies decide to engage in strategic partnerships to exchange data among them. *Industrial data platforms* formalise and operationalise these alliances which can encompass different business sectors, or be limited to a specific industry. Industrial data platforms very often rely on co-investment, contribution and collaboration for mutual interest.

In this study, other actors could be identified in the data economy ecosystem. These either play an intermediary role bringing together data suppliers and users, or they act as instrumental enablers providing specific technical solutions to share data. More concretely, *data marketplaces* act as a trusted intermediary between companies that wish to sell and buy data. The exchange and transaction of the data are usually made through an online platform specifically set up for these purposes. *Technical enablers*, on the other hand, provide solutions that create the technical conditions to exchange data. Enablers differ from data marketplaces. Whereas the latter actively seek to match data suppliers and data users according to their interests and needs, the former solely create the technical conditions for enabling data sharing and re-use.

Distinct business models exist to share data in business-to-business relations

Several business models could be identified in this study. Based on the findings from the fieldwork, the choice for a certain business model appears to be closely related to the reasons that drive a company to share data.

Data monetisation can be typically observed in companies that put in place a unilateral approach to share data. The main goal of these companies is to generate additional revenues from the data they generate and/or have access to (with due permission from private individuals).

Another type of data monetisation could be found in data marketplaces. While data suppliers sell their data to interested data users through the platform, the company managing the data marketplace generates revenue from each data transaction occurring in their platform.

Some companies opt for engaging in strategic and collaborative partnerships to obtain mutual benefits from the data they exchange. Data are usually shared for free in a closed, exclusive and secure environment. The combination of datasets from different companies result in visible gains to the parties involved. The companies taking part in such collaborative platforms (the so-called 'industrial data platforms') may be able to develop new or improved products and/or services, or even enhance their internal performance.

Businesses specialised in and specifically dedicated to enabling data sharing through the implementation of a technical solution (e.g. a web-based software product, an app, or a

platform) request a fee for setting up, using and/or maintaining the solution. These 'technical enablers' do not generate revenue from the data shared through their technical solutions.

Although less frequent, there are companies that adopt an open data policy. They are most likely legally bound to make data available to third parties. This was particularly observed in the energy sector.

Data are typically shared and re-used within the same sector

Although the insights collated through the survey should be interpreted with caution, they allowed for a better understanding of B2B data sharing and re-use in the EEA. The main data suppliers and data users appear to be large companies. Data are typically shared and re-used within the same sector. The information collated through the European Commission's public consultation mentioned above complement this finding by adding that data suppliers prefer sharing data only with companies with whom they have a close business relationship.

Data generated by internal IT business systems (e.g. information about products, services, sales, logistics, customers, partners or suppliers) and data generated by the Internet-of-Things (including sensors and mobile phones) are most commonly shared and re-used among companies. From these types of data, real-time or near-real-time data and transactional data are the features of data most frequently shared and re-used.

Finally, it is important to highlight that, according to the results of the survey, data suppliers tend to share a small proportion of the data they generate. This finding is in line with insights gathered through the European Commission's public consultation which indicate that data suppliers are licensing *some* of the data they hold to interested data users.

Insufficient financial investment in accessing real-time or positioning data from other companies appears to result in missed business opportunities for data users

Within the framework of this study, missed business opportunities are understood as new or improved products and/or services that a company was not able to bring to the market due to the impossibility of accessing data from other companies. The insights gathered through the survey lead to conclude that investing a significant amount of resources in accessing real-time and location/positioning data from other companies can positively impact on bringing more new or improved products and/or services to the market. Other factors that seem to interplay and increase business opportunities include the size, lifespan and presence of the company abroad.

Application Programming Interfaces are the preferred mechanism to share and re-use data among companies, but there are more technical solutions

This study corroborates the findings from previous research: both the survey and the fieldwork provide clear evidence that Application Programming Interfaces are the preferred technical mechanisms to share and re-use data in business-to-business relations. This particular mechanism has proven to provide easy and swift access to data, monitor the use of data and act upon cases of data misuse.

Other mechanisms could also be identified, including software development kits (SDKs), file transfer protocols (FTPs), cloud-based platforms, or web-based software products. Other less sophisticated mechanisms are used as well (e.g. through an email, or DVDs). Industrial data platforms and data marketplaces are also understood as technical mechanisms. They might combine a set of other mechanisms as those mentioned above.

There are significant technical and legal obstacles to data sharing

This study confirms findings from previous research by providing evidence that obstacles to data sharing exist. The most common obstacles to data sharing reported in previous research, in the present survey and identified during the fieldwork include technical barriers and related costs (e.g. lack of interoperability, safety and security requirements, or curation and infrastructure costs). Legal obstacles have also been found prominent deterrents to data sharing. These may refer to uncertainty about "data ownership" and what can be lawfully done with the data. In addition, companies seem to be generally concerned about the difficulties in meeting the legal requirements on data protection in a business-to-business context. Finally, both in this study and in the public online consultation[151], discriminating and costly conditions to acquire data from data suppliers have been pointed out as barriers to data re-use.

Technical skills are essential to engage in B2B data sharing, but so are legal competences

As evidenced by the case studies compiled for the purposes of this study, different skills are required to share data in business-to-business relations. Technical skills include IT expertise (e.g. software developers and engineers) that allow for the setup, implementation and follow-up of the infrastructure and mechanisms enabling data sharing, but also the visualisation of data if such tools are provided. This expertise may exist in-house, but some companies may opt for sub-contracting IT-related services or even partnering with other third parties to bring in this know-how. However, technical skills are just a piece of a set of competences that is required to engage in data sharing. As reported by the companies interviewed, legal skills are an important asset to ensure that legislation is well-understood, determine what can be lawfully done with the data, and act upon situations of data misuse. Finally, data science skills were also referred to. Likewise technical skills, these may not exist in the company. For that, partnerships have been established to ensure that meaningful use is made out of the data.

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[151] European Commission (2017), "Annex to the Synopsis report: Detailed analysis of the public online consultation results on Building a European Data Economy", 7.9.2017

Licensing agreements are key elements of B2B data sharing

Licensing agreements are an essential and necessary part of the process to share and re-use data among companies. These contracts clearly define the conditions and restrictions to use data, but also the period for which data can be re-used and for which purposes. The fieldwork brought out additional relevant insights with regard to licensing agreements. In most cases, although templates may exist, contractual agreements are customised to each data user. These agreements tend to be detailed which usually results in lengthy, time-consuming, expensive and complicated processes. As highlighted by some of the companies studied, besides providing legal protection, licensing agreements are also pertinent instruments to ensure trust among data users.

Build trust and keep things simple to successfully engage in B2B data sharing

This study provides in-depth insights regarding the factors that have positively contributed to successful data sharing experiences from various companies. Building trust with data users and data suppliers has proven to be a vital aspect to be taken into account from the start. Other key success factors include understanding the demand for data, establishing partnerships, and putting in place simple and user-friendly mechanisms, tools and licensing agreements. Finally, the legal and policy frameworks also play a role in regulating relevant issues (e.g. data protection, intellectual property) and fostering B2B data sharing.

More research is needed

Although recent research and consultation exercises allowed for a general understanding about B2B data sharing, more research is still needed to grasp the specificities of the different forms it can take. For instance, little is known about companies that act as technical enablers for B2B data sharing. The types of enablers need to be identified, and their role in the process further investigated. The opportunities and necessary conditions for supporting the emergence of these companies need to be studied. Considering that data marketplaces are rather unique in the European Economic Area, future research could identify and examine data marketplaces operating in other countries (e.g. in the United States of America, Japan, China). This would help understand which conditions need to be created in Europe to support other trusted intermediaries to set up their own data marketplace (for instance, specialising in a certain sector).

An assessment could be considered to understand in how far European regulations on data protection, free flow of data and privacy impact on data sharing in business-to-business relations in particular sectors (for example, telecoms).

10. Recommendations for future policy-making

This chapter provides a set of practical recommendations for future policy-making. These recommendations take into account the main issues that emerged from the analysis undertaken in this study, including feedback collected during the webinars and the conference from companies and stakeholders interested in B2B data sharing.

R1. Further develop the concept of B2B data sharing

Although companies have been sharing data among them for some years now, the concept of 'B2B data sharing' is rather new and unknown. On the other hand, this term has been interchangeably referred to as 'data access and transfer' in policy documents, which may also create uncertainties. This has led to misinterpretations, including on the intentions of the Commission as a regulator.

The European Commission is invited to:

- Co-develop a definition of B2B data sharing together with companies and stakeholders across the European Economic Area.

R2. Raise awareness about B2B data sharing

Since 2016, the European Commission has been organising a number initiatives aimed at engaging companies and other stakeholders in a broader discussion about data sharing in business-to-business relations. In a view to strengthen its actions, the European Commission is currently planning to set up a support centre for data sharing to help identify and share the best practices in Europe, and provide technical guidance.

The European Commission and national governments are encouraged to:

- Develop a user-centric campaign by involving companies and stakeholders in the whole co-creation process (from design to implementation). This campaign is aimed at clarifying the different dimensions and business models of data sharing and re-use between companies, drawing attention to the benefits of these activities, and explaining the specificities of the legal background regulating them.

- Continue adopting policy and practice-oriented instruments that raise awareness about the benefits of B2B data sharing and re-use. These may include communications, recommendations, resolutions, but also toolkits or guidelines that foster data sharing and re-use between companies.

- Give visibility to companies already engaged in B2B data sharing[152]. Such cases can help interested companies to understand how to kick-start their data sharing activity, how data can be securely and efficiently shared, as well as to

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[152] Examples of companies sharing data in business-to-business relations can be found in annex 4.

avoid and overcome some challenges experienced by others.

R3. Provide guidance in relation to relevant regulations and directives

During the last years, the European Commission has been committed to strengthening the legal framework by amending rules on data protection and privacy in electronic communications, and reviewing the database rights, or removing data localisation restrictions pertaining to non-personal data. These rules (or proposals for rules) cover important dimensions of data sharing and re-use in business-to-business relations. At the same time, this legal framework leaves sufficient room for contractual autonomy of companies, which they consider to be essential to pursue their business goals. For certain parts of this legislative framework, there appears to be a lack of knowledge regarding its practical application.

The European Commission is called on to:

- Raise awareness, clarify and guide companies to ensure that the scope of important regulations and directives is clearly understood.

- Explain the legal implications and scope of different regulations and directives in particular of the General Data Protection Regulation.

- Provide general guidance about the most suitable de-identification techniques.

R4. Monitor and evaluate the implementation of regulations

Companies and stakeholders that collaborated with the present study consider that there is lack of clarity and knowledge in relation to the application of recent changes in regulations put forth by the European Commission. Both legal and policy initiatives need to be closely followed up and evaluated to ensure that they are fit for purpose, and useful for European companies and citizens.

The European Commission should:

- Monitor the implementation of regulations and directives from the perspective of B2B data sharing and re-use in order to identify possible gaps or grey areas.

- Continue engaging in public consultations with companies and stakeholders to understand the obstacles encountered to comply with legislation.

R5. Co-develop a B2B data sharing framework

There is indication that B2B data sharing and re-use will grow in the next five years. This is expected to contribute to building a European data economy and ultimately to further establishing the digital single market. There is, however, a need for stronger guidance and recommendations in relation to basic principles and conditions to engage in data sharing in re-use in business-to-business relations.

The European Commission is invited to:

- Create a generic B2B data sharing framework that sets out basic concepts, principles and conditions for engaging in B2B data sharing and re-use, and provides recommendations to successfully transfer and access data to/from other companies. The framework should be developed in close cooperation with companies and stakeholders to ensure that their needs are taken on board, and to learn from and build on their experiences. The potential added-value of such framework resides in creating standards for companies to share and re-use data within the European Economic Area, and helping them to overcome common obstacles.

R6. Support the development of data interoperability and standards

Companies have reported to experiencing several technical obstacles to B2B data sharing and re-use, including lack of standardisation and interoperability, along with inherent costs. As acknowledged in previous discussions[153] and in the present study, there is a need to further develop data interoperability and standards.

The European Commission is encouraged to:

- Continue fostering interoperability and standards in the European data economy.

- Involve companies (including SMEs) in standardisation processes to ensure that their needs and challenges are taken into account. Sector-specific standards may need to be considered as well.

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[153] Esteban, D. (2016), Interoperability and Standards in the European Data Economy – Report on the EC Workshop, available at: https://ec.europa.eu/digital-single-market/en/news/interoperability-and-standards-european-data-economy-report-ec-workshop

R7. Fund projects that support companies to engage in B2B data sharing
B2B data sharing requires a continuous investment from companies to put in place and/or further develop secure and user-friendly technical solutions that enable the exchange of data. Whereas companies with longstanding history in the market and high revenues may be able to finance the implementation or improvement of technical solutions, small- or micro-sized companies may struggle to cope with such investments.
The European Commission should: • Make use of current funding programmes (e.g. Horizon 2020) to support companies to engage in B2B data sharing and re-use. For instance, encouraging companies to set up collaborative platforms to mutually benefit from the data exchanged. • Support start-ups to create technical solutions to enhance B2B data sharing. This study identified a few examples of companies that provide such solutions to enable data sharing in business-to-business relations[154].

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[154] For more information about the technical enablers identified in this study consult chapter 5 in this report.

ANNEXES

ANNEX 1: Detailed methodological approach

1. Desk research, literature and documentary review

A desk research was carried out to identify relevant academic and grey literature in the field of data sharing and re-use between companies. Moreover, policies and legislation in this area which are applicable to the EU and EEA levels were gathered. The desk research was also aimed at identifying companies that are already sharing data with other companies to assess their potential to be showcased in the present study.

A literature review was conducted of existing research in the field of data sharing and re-use between companies in the European Economic Area (EEA). A descriptive analysis of the policy and legislative framework in this area at EU and EEA level was done. The goal was to understand the current state-of-play in relation to data sharing and re-use in business-to-business relations in order to build on existing knowledge and grasp the specificities of the current policy and legal frameworks which impact on companies' data sharing and re-use activities.

2. Survey

About the sample. Considering the objectives of this study, the timeline and resources available, all the companies in the EEA could not be surveyed. Therefore, a sample from the population was selected and surveyed. Given the multiple factors that could have had an impact on this study (i.e. geographical distribution, company sizes and industry sectors), the most suitable sampling methodology was the stratified sampling, which would allow for a partition of the population into groups, called *strata*, before selecting the appropriate sample. This methodology ensures that a heterogeneous population of the companies in the EEA can be fairly represented by a sample. The multiple factors analysed in this study would require a large number of responses in order to guarantee that each strata is well represented. This methodology was expected to ensure a minimum of 150 respondents as set by DG CONNECT, and to achieve a minimum of representation for each of the variables.

Overall, sample sizes are usually determined by the degree of stratification of the sample. As the survey included multiple indicators, the computation of the required minimum sample size was a challenging exercise because it depended on the variance of each indicator. However, many of the indicators computed from the survey are proportions, such as a percentage of companies that engage in X activity. In this case, the computation of the sample size was simplified by the fact that the variance of a proportion is bounded. Assuming the maximum variance (0.5) the minimum level of precision is guaranteed[155]. In this study, the minimum sample size required for estimating proportions at global level with 8 % precision in 95 % confidence intervals

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[155] World Bank's Enterprise Surveys (ES) (2009), Sampling Methodology.

while assuming maximum variance[156]. As reference, 8 % precision of an estimate in a 95 % confidence interval means that we can guarantee that the population parameter is within the 8 % range of the observed sample estimate, except in 5 % of the cases.

A representative sample of EEA countries, six targeted business sectors and four different company sizes was expected to be covered. A random selection of countries has been created for this purpose based on their geographical location and relative size in terms of data market to ensure a balanced geographical coverage while ensuring the presence of countries of different data market size. In this way, our sample covered approximately 90 % of the data market according to a recent study on the European Data Market.[157] As a result, the study's sample comprised the following 17 EEA Member States: Belgium, Croatia, Estonia, France, Germany, Ireland, Italy, Lithuania, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, and the United Kingdom. A stratified sampling was applied taking into consideration factors such as knowledge of the marketplace, total number of companies and data market value of the countries[158]. The sample was distributed by country to reduce the error by randomness, ensuring that a minimum number of 5 companies completes the survey in each Member State.

Country name	Sample Size
Belgium	5
Croatia	6
Estonia	5
France	14
Germany	23
Ireland	5
Italy	13
Lithuania	5
Luxembourg	5
Netherlands	6
Norway	5
Poland	7
Portugal	5
Romania	6
Spain	11
Sweden	5
UK	24
Total	**150**

Sample by country

$$n = \left[\frac{1}{N} + \frac{N-1}{N} \frac{1}{PQ} \left(\frac{k}{z_{1-\alpha/2}} \right)^2 \right]^{-1}$$ where N=population size, P=population proportion, Q=1-P

[156] k=desired level of precision, $z_{1-\alpha/2}$ is the value of the normal standard coordinate for a desired level of confidence, 1-α.

[157] IDC and Open Evidence (2017), *European Data Market Study*, SMART 2013-0063, *op.cit.*, p. 112

[158] IDC and Open Evidence (2016), *European Data Market Study*, SMART 2013-0063

According to statistical theory, this sample size only assured precision at global level, not by strata. A random pre-selection of companies was carried out by country. This required more preparation but was expected to result in having a more robust sample of companies.

About the questionnaire. The survey's questionnaire was developed taking into account the insights collated from an initial internal workshop with the Project Team and the information gathered from the desk research. The questionnaire was put together in a participatory way involving the Project Team, officials of unit G1 of DG CONNECT and representatives of DGs who were present at the inception meeting. The questionnaire can be found in annex 2 and is structured in three parts:

1. Common demographic and economic questions to all respondents for analytical and comparison purposes

2. Set of questions to enquire about data sharing (i.e. respondents are data suppliers)

3. Set of questions to retrieve information on data re-use (i.e. respondents are data users).

A combination of closed- and open-ended questions was considered for this questionnaire. Closed-ended questions were privileged (including multiple choice – either single answer or multiple answer – and ranking type questions) to ease the completion of the survey and thus contribute to a higher response rate. Open-ended questions were included to collate more in-depth insights about data sharing and re-use, along with the prevailing barriers, as well as to enable respondents to add issues not foreseen in the questionnaire, thereby reducing potential biases.

The questionnaire was made available in eight different languages. A helpdesk was put in place to assist potential respondents in filling in the survey (e.g. by clarifying potential questions from respondents, or by providing technical support).

The survey was made available online using the European Commission's EUSurvey tool[159]. This tool was chosen because of its technical capabilities and user-friendly features, as well as its capacity to reach out to additional stakeholders and companies (other than those listed in our database) which could have triggered more responses. In addition, this tool is an EU-branded product and could thus have increased the companies' trust and willingness to complete the questionnaire.

The questionnaire was carefully developed to answer to the research questions formulated for the present study.

The survey questionnaire was pilot-tested so that it could be further refined before rolling the survey out across the EEA.

The online survey (including the pilot-test) ran from mid-August until end-November 2017.

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[159] Available at: https://ec.europa.eu/eusurvey/home/welcome

About the analysis. The analysis of the data and information collected through the survey followed the CRISP-DM methodology (Cross Industry Standard Process for Data Mining). This methodology, partly founded by the EC during the 1990s, is the most commonly used standard process model in both academic and industrial fields, and provides a solid framework for data mining projects. CRISP-DM is composed of a six-phase process which accounts for all the activities required to gather, classify, store and analyse the data, including:

- Business understanding

- Data understanding

- Data preparation

- Modelling

- Evaluation

- Deployment

About the missed business opportunities. In order to quantify missed business opportunities, a statistical model was built to predict the number of new or improved products and/or services a company brings to the market. This model was built according to the following assumptions:

- Companies that re-use data from other companies are more likely to bring more new or improved products and/or services to the market

- The number of new or improved products and/or services brought to the market is predicted using the demographic attributes of the company, aspects related to data re-use (like expenditure on accessing data, volume of data accessed) and a few macro-economic variables. The model did not consider other factors like spend by the company on research and development, product life cycle.

The methodology to predict the number of new products and services a company brings to market is organised in three phases:

Data understanding

The number of new or improved products and/or services brought to the market is predicted using the demographic attributes of the company, aspects related to data re-use (like spend on accessing data, volume of data accessed, feature of data accessed) and few macro-economic variables. An exploratory data analysis was carried out on the data collected through survey to understand the impact of these variables on the number of new or improved products and/or services brought to the market. The identification of the factors was based on the criteria of higher average number of new or improved products and/or services brought to the market. This phase of data exploration gave hints into what variables can be the predictor variables in the model building phase.

Model building

The aim of this phase was to build a predictive model based on demographic attributes of the company, data re-use activities and the macro-economic variables to estimate the number of new or improved products and/or services brought to the market. This

formula obtained by building the model enabled the quantification of the impact of each of the predictor variables on the number of new or improved products and/or services brought to the market.

A regression model was used to explain the variation in the number of new or improved products and/or services brought to the market with respect to predictor variables (especially the data re-use variables).

The model was built on the data collected through the survey from 129 companies. The number of new products and services brought to market was predicted using a Generalised Linear Model (GLM) due to the following reasons:

- The number of new or improved products and/or services brought to the market in the past three years is *count data* which are not normally distributed. Moreover, the variability in the number of new or improved products and/or services brought to the market is unequal across various predictor variables.

- The number of new or improved products and/or services brought to the market by the 129 companies that participated in the survey are ranging from zero to 10 000. In order to capture this kind of over dispersed count data a Negative Binomial Regression[41] was used which is a special case of the Generalised Linear Model.

During the data understanding phase, some of the factors that would possibly affect the variable of interest were identified. The model building was an iterative process by including various combinations of these variables and in each iterative step the decision of including a variable was taken based on the following criteria:

- The predictor variable added was statistically significant[160] in predicting the variation in the number of products and services

- Adding the variable reduced the residual error[161] of the model

Best fit model chosen to predict the number of new or improved products and/or services brought to the market was the model which had the minimum residual error and had all predictor variables as significant in the model. It is important to note that some of the factors included in the model were a combination of two variables to improve the prediction. The table below shows the various factors considered in this iterative process and the variables that turned significant in the best fit model.

Factor	Sub-factors	Significant in the model
Demographic attributes of the company	Size of the company	✔
	Country	Limited data at country level
	Sector	Limited data at sector level

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[160] Statistically significant implies that a relationship between the variable of interest and predictor variables is caused by something other than random chance (with a confidence interval of 95 %)
[161] Pearsons Residual Error is understood as the difference between the observed value and the estimated value divided by the estimated variance of the prediction.

Factor	Sub-factors	Significant in the model
Macro-economic factors	Presence abroad	✔
	Age of the company	✔
	Gross Domestic product (GDP)	✘
	Unemployment rate	✘
Data re-use	Data re-used	✔
	Duration of data re-use activity	✘
	Volume of data re-used	✘
	Expenditure on data re-use	✔
	Kind of data re-used	✘
	Feature of data re-used	✔
	Number of sectors from which data is re-used	✘
	Sectors from which data is re-used	✘

Factors to estimate missed business opportunities

Although this predictive model was put together based on a limited number of variables, the iterative process of building the model brought out pertinent findings:

- Re-using data from a particular or several sectors does not appear to contribute to any increase in the number of new or improved products and/services brought to the market

- The kind of data being re-used (like Internet-of-Things (IoT) or data from internal IT business systems) did not impact on the number of new or improved products and/or services brought to the market

- On the other hand, the volume of data and the timespan during which a company has been re-using data appear to impact on the number of new or improved products and/or services a company brought to market

- The expenditure on data re-use also proved to impact on the number of new or improved products and/or services a company brought to market. Indeed, the expenditure on data re-use was able to predict the number of new or improved products and/or services brought to the market more accurately than the two former variables (i.e. volume and timespan). This variable may be more accurate because it captures companies that re-use data, but also different dimensions of the data (such as quality of the data). As a result, the variable 'expenditure on data re-use' was chosen.

3. Case studies

About the questionnaire. An interview questionnaire was put together to guide the interviews (see annex 3) and to ensure that key information was consistently collated. Semi-structured interviews were carried out in order to allow for some freedom and bring in new topics according to what the interviewee says. Likewise the survey, the interview questionnaire was pilot-tested with two selected cases. This allowed for fine-tuning the interviewer's performance, the length of the questionnaire, and reformulating some of the questions.

About the selection criteria. Potential case studies were identified against a set of criteria: representation of all sectors and company sizes targeted within the framework of this study; identification of companies headquartered in different countries; portrayal of companies using distinct technical mechanisms to share data; and depiction of businesses sharing data with a wider audience and exclusively with selected groups of users. After identifying the companies, these were invited to participate in an interview to gather relevant information to describe their respective case studies.

About the case studies. Thirty-three companies were identified and contacted to participate in the study. Sixteen companies accepted to be interviewed and to have their case study described in this report. All companies received a list of questions prior to the interview so that they could properly prepare themselves. An informed consent was signed by all interviewees. Whereas some interviews were undertaken remotely (by phone or videoconference), others were conducted face-to-face. The interview phase ran from end-August until mid-December 2017. The duration of the interviews varied between 45 and 125 minutes. All interviews (except one) were recorded (with due permission of the interviewees) and transcribed. The transcriptions were analysed using a qualitative data analysis software (MAXQDA). Analytical codes were developed to analyse the transcriptions. The information gathered through the interviews was completed with a web-based search and documentary review. A template was created to describe the case studies. More specifically, the following dimensions were analysed: motivation to share data with other companies, business model, type of data shared, technical mechanisms and skills needed to successfully share data with other companies, obstacles to and success factors for data sharing, and lessons learnt according to companies' experiences.

About the webinars. Four webinars were organised between 5 and 8 December 2017. Fifty-four participants joined the webinars, including representatives of companies, associations, academia, and EU officials. The webinars were oriented to gathering additional information from the identified companies by giving them the opportunity to showcase their experiences, and to further discussing obstacles to and success factors for data sharing between companies. Additionally, the webinars were also aimed at debating recommendations for future policy-making in this field. Ultimately, the webinars were intended to further promote data sharing and re-use between companies in the EEA.

ANNEX 2: Survey questionnaire

Following up on its Communication on 'Building a European Data Economy' (January 2017), the European Commission decided to assess the economic value and potential of data sharing between companies in Europe. A study has been commissioned to *everis* to estimate the quantitative dimension of data sharing between companies inside the European Economic Area (EEA), along with the missed business opportunities resulting from the lack of access to relevant data. Finally, this study also seeks to identify obstacles to and success factors of data sharing.

As the responsible contractor for this study, *everis* launched this survey to gather information from companies that are either **sharing data** (i.e. making their data available to other companies which are not direct competitors, either for free or against some form of compensation, for business purposes) or **re-using data** (i.e. accessing data from other companies which are not direct competitors, either for free or against some form of compensation, with the purpose of improving their business or product/service catalogue), or both.

In order to better understand the questionnaire, we prepared a checklist and a glossary that we encourage you to check before answering the questions. Both documents were sent to you in a separate email with the link to this survey. The estimated time needed to complete the questionnaire is 20 minutes.

Please be assured that any commercially confidential information that you provide in this questionnaire will be protected. Responses will not be published individually, but in an aggregated manner to avoid the identification of companies/respondents. We thank you in advance for your participation.

1. ABOUT YOU AND THE COMPANY

1.1 Name of the company*

1.2 Website of the company*

Your name, position and e-mail are being asked hereafter to be able to contact you directly in case any question needs to be clarified. <u>*Please be reassured that this information will not be disclosed with any other party (including the European Commission).*</u>

1.3 Name and surname of the person responding to this questionnaire*

[   ]

1.4 Position of the respondent in the company*

[   ]

1.5 Email of the person responding to this questionnaire* (with verification)

[   ]

1.6 Where are the headquarters of your company? Please indicate the country that applies. In case you represent an international company, please select the country where the European headquarters are located. (*dropdown list*)*

- Austria
- Belgium
- Bulgaria
- Croatia
- Cyprus
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Hungary
- Iceland
- Ireland
- Italy
- Latvia
- Liechtenstein

- Lithuania

- Luxembourg

- Malta

- Norway

- Poland

- Portugal

- Romania

- Slovakia

- Slovenia

- Sweden

- Spain

- The Netherlands

- United Kingdom

1.7. Does your company have operations in another country?*

- Yes (respondents will continue to 1.7.1)

- No (respondents will be re-directed to 1.8)

1.7.1 Please specify where

1.8. What is the size of your company? Please select the option that applies (*single answer*)*[162]

- Fewer than 10 employees

- 10 to 49 employees

- 50 to 249 employees

- 250 or more employees

1.9. In which sector does your company operate? Please select the main sector that applies (*single answer*)*

- Agriculture

- Automotive and Transport

- Energy and utilities

- Health and Care

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[162] Based on Eurostat classification: http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Enterprise_size

- Manufacturing and processing

- Telecommunications

- Other:

1.10. What was your total revenue in the last three financial years? (i.e. 2014, 2015 and 2016).* Please indicate the figure in EUR (e.g. 10.000, 1.000.000).

1.11. How many new or improved products and/or services did your company bring to the market in the last three financial years?*

Please provide a number. For a definition of 'improved product/service', please consult the glossary provided.

products/services.

1.12. How did these new or improved products and/or services contribute to the revenue of your company in the last three financial years? Please select the option that applies (*single answer*)*

- Up to 1%

- Up to 5%

- Up to 10%

- Up to 20%

- More than 20% (*respondents will continue to 1.11.1*)

Please specify how much if more   **than 20%***

2. DATA SHARING (SUPPLY SIDE)

Please be reminded that for the purposes of this survey the term 'data sharing' is to be understood as: a company making data available to other companies that are <u>not</u> direct competitors, either for free or in exchange for remuneration or compensation, for business purposes. There are several technical mechanisms to share data, such as the actual transfer of a data file or data consumption through an Application Programme Interface (API) provided by the data supplier. Please note that data made available to sub-contractors do not count as 'data sharing'.

An illustrative example: *A telecom company makes available aggregated localisation data from its mobile phone users to a chain of hotels and restaurants in a particular country, allowing them to target these customers with advertisement, offers and discounts based on their location.*

2.1. Does your company share data with companies that are <u>not</u> your direct competitors for business purposes?*

- Yes (respondents will continue to question 2.2)

- No (respondents will be re-directed to questions 2.1.1-2.1.4.)

2.1.1. Why is your company <u>not</u> sharing any data with companies that are <u>not</u> your direct competitors for business purposes? Please indicate the reason(s) that apply (*multiple answer possible, 5 at most*)*

- Privacy concerns

- Uncertainty about safety, security and liability conditions related to the technical process of sharing data

- Economic cost of sharing data (e.g. costs of making the data available in the desired format, infrastructure costs related to data collection, data curation costs, etc.)

- High efforts and burden on the company to engage in this activity (e.g. collection, analysis, etc.)

- Lack of data skills inside the company

- Trade secrets / fear of misappropriation by others / considerations of commercial strategy

- Lack of appropriate licensing conditions

- Uncertainty about usage rights on the data and potential reputational costs for the company in case of misuse

- Lack of incentives to share data

- Difficulties with measuring the value of data

- Lack of demand for my company's data

- Other:

2.1.2. How likely do you think it is that your company will share data with other companies in the next five years? *(single answer)**

- Extremely unlikely

- Unlikely

- Likely

- Extremely likely

- I do not know

2.1.3. Do you see any benefits of sharing data with other companies?*

- Yes (respondents are re-directed to question 2.1.3.1 and following)
- No (respondents continue to question 2.1.4)

2.1.3.1. From the list below, please indicate the option(s) that according to you are benefits of sharing data with other companies.*

- Data can be monetised and generate revenues for my company
- Data can allow my company to enter into partnerships with other companies
- Data supports the innovation component of my company
- Other:

2.1.4. What would make your company more willing to share data with other companies?*

Please add your comments using the 'other' field (*multiple answer, at most 4 choices*)

- Certainty about how to share data from a contractual point of view
- Legal clarity about the "ownership" rights of the data
- Ability to track the usage of the data once it has been shared
- An improved framework to protect the investments made for the purpose of data collection, curation, anonymisation, etc.
- Availability of the necessary technical skills inside my company to ensure the quality and security of the data shared
- A defined framework for liability in case of damage caused by the data that are shared
- Availability of standards and/or infrastructure to facilitate the adequate storage, transfer and processing of data
- Adequate monetary compensation
- Other:

2.1.5. With which sector(s) would your company potentially be interested in sharing data?*

Please select the sector(s) that apply. (*multiple answer, at most 5 choices*)

- Manufacturing and processing
- IT services, including app/software developers
- Agriculture and Food

- Health and Care

- Energy and utilities

- Automotive and Transport

- Financial services/banking

- Insurance

- Retail/electronic commerce

- Wholesale trade

- Electronic communications

- Media, communication, entertainment

- Education

- Public sector

- Research

- Hotels & restaurants

- Construction

- Other: [   ]

Upon completion of this question, respondents who are <u>not</u> sharing data will be re-directed to section 3 of the questionnaire (data demand side).

2.2. Please indicate how important sharing data is for your company (*single answer*).*

- Sharing data is one of the main activities of my company (e.g. a company sells sensors to monitor temperature of greenhouses, but it makes the most revenue from the actual data collected by these sensors, not from the sales of the sensors themselves).

- Sharing data is a secondary activity of my company (e.g. a company produces robot vacuum cleaners that collect information about the surfaces in order to optimise their performance. The company makes its largest revenues from the sales of the robots, but it also sells the data collected to other interested companies, obtaining a marginal income).

- Sharing data is a secondary activity of my company at present, but it is likely to become one of my main activities in the next five years.

2.3. From the data your company holds, please indicate the kind of data that you mostly share:* (*multiple choice, at most 2 choices*)

- Data generated by the Internet of Things (IoT) and physical devices, including sensors or mobile phones

- Data generated by internal IT business systems, mainly containing information about products, services, sales, logistics, customers, partners or suppliers (CRM, EPR, etc.)

- Data generated through external interaction with users (i.e. cookies, web tracking, logs)

- Data generated from crowdsourcing or web collaboration

- Other:

2.4. What other kind(s) of data does your company share besides the ones

mentioned above? (*open question*)

2.5. What is the feature of data that your company mostly shares?*

(*multiple choice, at most 2 choices*)

- Localisation/positioning data

- Real time or near-real time data

- Transactional data

- Anonymised or pseudonymised microdata

- I do not know

- Other:

2.6. What volume of data does your company generate on a monthly basis?*

(*single answer*)

- Up to 10 Gigabytes (GB)

- Up to 100 GB

- Up to 1 Terabyte (TB)

- Up to 10 TB

- Up to 100 TB

- Up to 1 Petabyte (PB)

- Other (please specify how much): [   ]

2.7. Specify the percentage of data usually shared with other companies on a monthly basis out of the data that your company generates:*

(*single answer*)

- Less than 1%
- Up to 5%
- Up to 10%
- Up to 25%
- Up to 50%
- If more than 50%, please indicate the % [   ]

2.8. In how many data transactions does your company engage on a monthly basis? Please specify a) the number of transactions and b) the measurement unit

(e.g. number of events reported by sensors, number of clicks, number of downloads, number of credit card payments, number of log entries, etc.) (*open question*)

[   ]

2.9. With which business sector(s) does your company share data?*

(*multiple choice, at most 5 choices*)

- Manufacturing and processing
- IT services, including app/software developers
- Agriculture and Food
- Health and Care
- Energy and utilities
- Automotive and Transport
- Financial services/banking
- Insurance
- Retail/electronic commerce
- Wholesale trade
- Electronic communications
- Media, communication, entertainment
- Education
- Public sector

- Research

- Hotels & restaurants

- Construction

- Other:

2.10. What is your annual average income from sharing your data with other companies in the three last financial years?*

Please select the range that applies (*single answer*)

- Less than 5,000€/year

- Between 5,001 and 10,000€/year

- Between 10,001 and 20,000€/year

- Between 20,001 and 30,000€/year

- Between 30,001 and 50,000€/year

- Between 50,001 and 100,000€/year

- Up to 1,000,000€/year

- Up to 5,000,000€/year

- More than 5,000,000€/year (*respondents will continue to 2.10.1*)

2.10.1. Please, specify the annual average income

2.11. For how long has your company been sharing data?*

(*single answer*)

- Less than one year

- 1-2 years

- 3-5 years

- 6-8 years

- Over 8 years (*respondents will continue to 2.11.1*)

2.11.1. Please specify how many years if more than eight:

2.12. Why does your company share data with other companies?*

(*multiple choice, at most 3 choices*)

- Economic value of the data sold (data revenues)

- Possibility to establish partnerships with other companies interested in my data

- Legal requirements to share data

- Economic incentives to share data (e.g. fiscal incentives, subsidies, etc.)

- Possibility to develop new business models and/or products or services

- Other: [   ]

2.13 Has your company ever experienced any obstacles to sharing data?*

- Yes (respondents will continue to 2.13.1 and following)

- No (respondents will be re-directed to 2.14)

2.13.1 What kind of obstacles(s) has your company experienced to sharing data with other companies? Use the 'other' field to add additional obstacles if applicable.*

(*multiple choice, at most 4 choices*)*

- Data localisation restrictions in place (e.g. legislation)

- Lack of skilled data workers

- Technical obstacles and related costs (e.g. making data available in the desired format, compliance with safety and security requirements, compliance with anonymisation/encryption requirements, infrastructure costs linked to storage, curation costs, etc.)

- Legal uncertainty about the "ownership" rights of the data and/or about what my company can lawfully do with them

- Difficulties to track and have control on the use of the data, including if data are further shared with third parties

- Fear of reputational costs for my company in case of inaccuracy of the data shared or misuse of data

- Uncertainty about liability costs in case of damage caused by the data shared

- Difficulty in finding the appropriate means to license usage of my data

- Other: [   ]

2.14 Under which conditions does your company mostly share data with other companies?*

Please specify if you use another condition not foreseen in the options below using the field 'other' (*multiple choice, at most 2 choices*)

- For free to a wide range of users and with no or very little restrictions ("Open Data")

- For free to a specific group of users and with no or very little restrictions

- Remunerated, to a wide range of users on a basis of fair and non-discriminatory conditions

- Remunerated, to a group of users on a basis of individually negotiated conditions

- Remunerated and on an exclusive basis through individually negotiated conditions

- Compensated by the provision of a service on a basis of individually negotiated conditions

- Other: [_____]

2.15. Which mechanisms does your company use for sharing data?*

(*multiple choice, at most 4 choices*)

- Application Programming Interfaces (APIs)

- Own websites

- Online data repositories/portals

- File Transfer Protocol (FTP) services

- Private apps, platforms and services

- Emails

- Data marketplaces

- Data brokers or aggregators

- Industrial Data Platforms

- Other: [_____]

2.16 Based on your experience, what factors helped your company to successfully share data with other companies?

(*open question, 750 characters maximum*)

[   ]

Upon completion of this question, respondents who are sharing data will be re-directed to section 3 of the questionnaire (data demand side).

3. DATA RE-USE (DEMAND SIDE)

Please be reminded that for the purposes of this survey the term 'data re-use' is to be understood as the access to and use by a company of data from other companies that are <u>not</u> direct competitors with the purpose of developing or improving its business or products/services catalogue. Such access can be either for free or against payment.

Please note that companies that access data from other companies as sub-contractors are <u>not</u> considered as data re-users under this survey.

3.1. Does your company re-use data from other companies?*

- Yes (respondents will be re-directed to 3.2)

- No (respondents will continue to 3.1.1.)

3.1.1. Why is your company <u>not</u> re-using data from other companies?*

(*multiple choice, at most 3 choices*)

- We do not use data for our business model

- The data we would need are not available

- Safety, security and liability reasons

- Economic costs (i.e. fees, data analysis, data curation, etc.)

- We produce and analyse the data we need in-house

- Uncertainty about ownership rights and usage of the data

- Lack of expertise within the company to use the data

- Other:

3.1.2. How likely do you think it is that your company will make use of data from other companies in the next five years? (*multiple choice, single answer*)*

- Extremely unlikely

- Unlikely

- Neutral

- Likely

- Extremely likely

- I do not know

3.1.3. Does your company see any benefits of re-using data generated by other companies?*

- Yes (respondents will continue to 3.1.3.1)

- No (end of survey)

3.1.3.1. From the list below, please select the option(s) that according to your company are benefits of re-using data generated by other companies:

(*multiple choice, at most 3 choices*)

- Data can improve my catalogue of products and/or services

- Data can support the development of new products/services

- Data can improve my relation with the clients

- Data can increase my company's productivity and/or efficiency

- Data can contribute to cost reductions in my company

- Data can improve my marketing efforts

- Other: [   ]

3.1.3.2. Please select the sector(s) your company would be interested in accessing data from for business purposes*

(*multiple choice, at most 5 choices*)

- Manufacturing and processing

- IT services, including app/software developers

- Agriculture and Food

- Health and Care

- Energy and utilities

- Automotive and Transport

- Financial services/banking

- Insurance

- Retail/electronic commerce

- Wholesale trade

- Electronic communications

- Media, communication, entertainment

- Education

- Public sector

- Research

- Hotels & restaurants

- Construction

- Other: [   ]

3.1.3.3. How much would your company be willing to pay per year to be able to access such data?*

Please select the option that corresponds to the maximum amount that your company would be willing to spend.

- Less than 5,000€/year

- Up to 10,000€/year

- Up to 20,000€/year

- Up to 30,000€/year

- Up to 50,000€/year

- Up to 100,000€/year

- Up to 1,000,000€/year

- More than 1,000,000€/year

End of the survey for those who <u>do not</u> re-use data but see the benefits of doing so.

3.2. Why does your company re-use data from other companies?*

(*multiple choice, at most 3 choices*)

- Using data from others helps me to improve my catalogue of products and/or services

- Using data from others supports the development of new products/services

- Using data from others makes my company more efficient

- Using data from others optimises the internal processes of my company

- Using data from others improves my relations with the clients

- Using data from others allows me to launch more targeted marketing campaigns

- Other: [   ]

3.3. What is the strategic importance for your company of re-using data from other companies?*

- Not important

- Somewhat important

- Very important

- Extremely important

3.4. Please rank from 0 to 5 the extent to which your company depends on data from other companies for:*

Key: 0 stands for 'no dependence' and 5 stands for 'high dependence'

The products or services that your company offers**

0 – 1 – 2 – 3 – 4 – 5

Your internal business processes**

0 – 1 – 2 – 3 – 4 – 5

Improving the relations with your clients**

0 – 1 – 2 – 3 – 4 – 5

3.5. What is the volume of data that you re-uses from other companies on a monthly basis?*

- Up to 10 Gigabytes (GB)

- Up to 100 GB

- Up to 1 Terabyte (TB)

- Up to 10 TB

- Up to 100 TB

- Up to 1 Petabyte (PB)

- Other (please indicate the volume and the ⬚

3.6. What kind of data does your company re-use the most?*

(*multiple choice, at most 2 choices*)

- Data generated by the Internet of Things (IoT) and physical devices, including sensors or mobile phones

- Data generated by internal IT business systems, mainly containing information about products, services, sales, logistics, customers, partners or suppliers (CRM, EPR, etc.)

- Data generated through external interaction with users (i.e. cookies, web tracking, logs)

- Data generated from crowdsourcing or web collaboration

- Other: ⬚

3.7. What other kind(s) of data does your company re-use? (*open question)*

⬚

3.8. What is the feature of data that your company mostly re-uses?*

(multiple choice, at most 2 choices)

- Localisation/positioning data
- Real time or near-real time data
- Transactional data
- Anonymised or pseudonymised microdata
- I do not know
- Other:

3.9. From which business sectors does your company re-use data?*

(multiple choice, at most 5 choices)

- Manufacturing and processing
- IT services, including app/software developers
- Agriculture and Food
- Health and Care
- Energy and utilities
- Automotive and Transport
- Financial services/banking
- Insurance
- Retail/electronic commerce
- Wholesale trade
- Electronic communications
- Media, communication, entertainment
- Education
- Public sector
- Research
- Hotels & restaurants
- Construction
- Other:

3.10. What other data that are currently <u>not</u> made available to your company

would you need for your business purposes? (*Open question*)

3.11. From which business sector(s)?

(*multiple choice, at most 5 choices*)

- Manufacturing and processing
- IT services, including app/software developers
- Agriculture and Food
- Health and Care
- Energy and utilities
- Automotive and Transport
- Financial services/banking
- Insurance
- Retail/electronic commerce
- Wholesale trade
- Electronic communications
- Media, communication, entertainment
- Education
- Public sector
- Research
- Hotels & restaurants
- Construction
- Other:

3.12. For how long has your company been re-using data from other companies? (*single answer*)*

- Less than one year
- 1-2 years
- 3-5 years
- 6-8 years
- Over 8 years (*respondents will continue to 3.12.1*)

3.12.1. Please specify how many years if more than eight:

3.13. What are the conditions under which data are <u>mostly</u> made available to your company?*

Please specify any other applicable condition that is not foreseen in the options below using the 'other' field (*multiple choice, at most 2 choices*)

- For free to a wide range of users and with no or very little restrictions ("Open Data")

- For free to a specific group of users and with no or very little restrictions

- Remunerated, to a wide range of users, on a basis of fair and non-discriminatory conditions

- Remunerated, to a specific group of users, on a basis of individually negotiated conditions

- Remunerated and on an exclusive basis through individually negotiated conditions

- Compensated by the provision of a service on a basis of individually negotiated conditions

- Other:

3.14. On average, how much did your company spend on an annual basis to access data from other companies in the last three financial years (2014, 2015, 2016)? (*single answer*)*

- Less than 5,000€/year

- Between 5,001 and 10,000€/year

- Between 10,001 and 20,000€/year

- Between 20,001 and 30,000€/year

- Between 30,001 and 50,000€/year

- Between 50,001 and 100,000€/year

- Up to 1,000,000€/year

- Up to 5,000,000€/year

- More than 5,000,000€/year (*respondents will continue to 3.14.1*)

3.14.1. Please, specify how much if more than 5 million EUR:

3.15. Which mechanism(s) does your company mostly use for accessing data from other companies?*

(*multiple choice, at most 4 choices*)

- Application Programming Interfaces (APIs) provided by the data supplier

- Website of the data supplier

- Online data repositories/portals

- File Transfer Protocol (FTP) services

- Private apps, platforms and services

- Emails

- Data marketplaces

- Data brokers or aggregators

- Industrial Data Platforms

- Other: [   ]

3.16. Has your company experienced any obstacles when accessing data from other companies?*

- Yes (respondents will continue to 3.16.1)

- No (end of survey)

3.16.1. What kind of obstacle(s) has your company experienced when accessing data from other companies?*

(*multiple choice, at most 3 choices*)

- Denial of access to data

- Data localisation measures/legislation/practices in place

- Unfair or abusive terms or conditions imposed by the data supplier

- Prohibitive prices for accessing the data

- Data made available in formats that cannot be easily integrated into my destination systems or processes (i.e. interoperability issues)

- Unforeseen termination of access that did not allow my company to adapt its business model

- Other: [   ]

3.17. Based on your experience, what factors helped your company to successfully access data from other companies? (*open question, 750 maximum*)

[   ]

End of survey

Thank you for all the information shared in this questionnaire. Please be assured that any commercially confidential information will be protected. Responses will not be published individually.

Should you need to rectify or complement any of the information provided, you may contact our helpdesk at: data.sharing@everis.com. Any questions about the study or the survey can also be addressed to this mailbox.

ANNEX 3: Interview questionnaire

The questionnaire below was tailored to each company depending on the information already known (either through the survey, or through a web-based search).

HISTORICAL OVERVIEW

1. First of all, we would like to get acquainted with the 'data sharing' history of your company. Could you please tell us when your company decided to start sharing data with other companies, what triggered this need and how it evolved throughout time?

2. Why has your company decided to continue to share data on a regular basis?

IMPORTANCE OF DATA SHARING TO COMPANY'S REVENUE

3. Would you consider that sharing data is one of the main activities of your company (in terms of income)? Why?

4. *If yes,* can you name up to five aspects that help your company to be recognised as a data supplier?

TECHNICALITIES & SKILLS

5. What kind of data does your company share with other companies?

6. How would you describe the strategic value of the data shared with other companies by your company? Are data a business asset or rather secondary to your business operations/goals? Are your data indispensable to advance business objectives of other companies (e.g. product/service specifications)?

7. What are the most important technical mechanisms used to share data with other companies?

8. Are there any special skills needed to share data with other companies?

9. What are the most important technical aspects (including human resources) contributing to a successful data sharing activity?

BUSINESS-TO-BUSINESS RELATIONSHIP

10. How does your company promote its data sharing offer?

11. How do companies reach out to you?

12. What type of companies are most interested in your data? Can you give concrete examples?

13. If we consider the process that covers the promotion of your data to the actual data transaction, which factors do you believe to be essential to ensure a successful interaction with other companies?

CONDITIONS FOR SHARING DATA

14. Under which conditions does your company share data with other companies?

15. Could you please provide more details in relation to the contractual arrangements and/or the particular clauses used when data are shared with other companies?

16. What are the main benefits of these conditions? Are there any pitfalls?

17. *If the company adopts an 'open data' policy:* Why has your company decided to share its data for free to a wide range of users with no or very little restrictions?

OBSTACLES

18. Has your company ever experienced any obstacles in sharing data with other companies?

19. *If yes,* could you describe in more detail some of these obstacles? For instance, could you please describe up to three concrete cases where your company faced obstacles (identify which) to share data with other companies?

20. How has your company overcome them? Which were the most important conditions to be able to overcome these obstacles?

21. Did these obstacles result in specific costs? *If yes,* what kind of costs and how much?

MISSED BUSINESS OPPORTUNITIES

22. Did your company ever experienced a situation in which it could not access crucial data from another company? Did this result in the impossibility of developing a new product/service or improving an existing one?

23. What prevented your company from accessing data from another company?

24. What was the impact in terms of efficiency in internal processes and/or increased output and achieving certain outcomes (measured through turnover, sales figures, number of clients)?

25. We are interested in gaining further insights on how companies calculate the monetary value of the non-availability of data. Could you share some thoughts with us?

SUCCESS FACTORS & LESSONS LEARNT

26. Based on your experience, what factors helped you to successfully share data with other companies?

27. All-in-all, what are the three most important lessons you have learnt about sharing data with other companies?

SUCCESSFUL CASES

28. Are you aware of products/services that were brought to the market because companies had access to your data?

29. *If yes,* describe up to three cases which you deem successful as a result of having access to data shared by your company.

30. Why do you consider this/these case/s successful? Can you name a few success factors?

ANNEX 4: Case studies

European Commission

Study on data sharing between companies in Europe
Luxembourg, Publications Office of the European Union

2018 – 153 pages