Body of European Regulators for Electronic Communications

BEREC

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BEREC Report on the Data Economy

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Contents

1. EXECUTIVE SUMMARY AND MAIN FINDINGS

The increasing availability of data and tools to analyse data is changing a large portion of the European economy. BEREC is interested in knowing about the impact of the data economy on electronic communications services (ECS), the role of ECSs in facilitating the development of the data economy, as well as how National Regulatory Authorities (NRAs) can benefit in their activities from the tools of the data economy. BEREC is also interested in analysing how NRAs can collaborate with other institutions, as well as to explore if the experience acquired by NRAs in regulating ECSs can be valuable in tackling possible competitive concerns pertaining to the development of the data economy.

As shown in Annex 1, some NRAs are currently analysing different aspects of the data economy, as well as its impacts on the telecommunications sector. In 2018, BEREC also launched a public consultation to collect views from different stakeholders. The present report has taken account of the valuable inputs to this consultation that were sent by 19 stakeholders from a variety of sectors[1], whilst also taking into account the views of NRAs.

The report reviews the concept of the "data economy", the economic characteristics of data, the particularities of online competition, as well as explains the relevant regulatory framework and outlines the competent authorities for the data economy at the European level. The analysis of the existing legal framework shows that there are several regulations that address different issues, ranging from privacy and data protection to e-commerce and open data. The European Electronic Communications Code (EECC) only touches on issues related to the data economy in a very lateral way, focusing on electronic communications services (including interpersonal communications services). Regulatory powers related to different aspects of the data economy are assigned to different institutions, such as data protection authorities, competition authorities (applying general competition law to the data economy), governmental offices promoting open data policies, or cybersecurity authorities. Broadly speaking, although NRAs are involved in the interactions between ECS providers and Internet content providers, in general NRAs have limited direct power in the data economy. In the cases where they have a stronger role to play, it is derived from their role as integrated regulators covering ex-post regulation or other sectors.

Electronic Communications Networks act as the infrastructure over which data is transmitted and are critical for the flow of data. The promotion of competitive and innovative ECS markets is necessary, although not sufficient, to ensure that European society makes optimal use of the data economy.

ECSs are also a relevant source of rich and valuable data. For example, smartphone location data –given compliance with the corresponding legal provisions on data protection and confidentiality – can be used by public institutions to provide relevant value-added services to business. This report provides a taxonomy of different types of data that are

[1] See "BEREC summary on the outcome of the public consultation on the data economy" BoR (19) 45. BEREC, June 2019. Available at https:// berec.europa.eu/

available to different actors, such as fixed operators, MNOs[2], MVNOs[3], OTT[4] providers and device manufacturers.

Due to the growing importance of data collection and analysis, the ability to collect and process data can be of competitive significance to ECS providers, and – just as in other sectors – economies of scale and scope exist in the collection and processing of data. For instance, in the context of mobile services, the competitive positions of MNOs and MVNOs may be different, taking into account whether they have exclusive access to network data.

NRAs also benefit from the use of data to take regulatory decisions supported by data-driven empirical evidence. This report reviews different areas in which NRAs apply data collection and analysis, for instance in *ex post* evaluation of regulatory policies, market analyses and when publishing additional public information to consumers and stakeholders. In the future, there is likely to be greater scope for regulators to use the tools and methods of the data economy, which will bring its own challenges and demand for resources.

The last section of this report explores how the experience that NRAs have gained in regulating ECS markets can be used now and in the future when dealing with the data economy. NRAs and other institutions, such as competition authorities or data protection authorities, could collaborate to address issues on the data economy, especially in areas where NRAs have gained relevant experience (e.g. market power assessments, interoperability, access obligations, etc.). In addition, the experience of NRAs could be very valuable in the future if any *ex ante* economic regulation within the data economy becomes necessary. For instance, NRAs have acquired practical experience in balancing incentives for innovation and the need for competition when imposing access or interoperability obligations, including the implementation and monitoring of such measures in a timely and efficient manner.

As part of its planning for the future, BEREC intends to work on sharing experiences with regard to the application of tools for collecting and analysing data in order to improve regulatory activities, to support initiatives with regard to the monitoring of data markets, and to collaborate with other institutions in these areas. BEREC and the NRAs will also monitor and take into account the impact of data on competition in ECSs.

Finally, BEREC considers that, taking account of the increasing relevance of the data economy, monitoring the evolution of data-related markets (which may be done by any relevant institution, not necessarily BEREC) is key to identifying potential future competition issues, protecting consumer welfare and promoting innovation.

2. INTRODUCTION AND OBJECTIVES

Data has become a key resource for companies, civil society and administrations. The advances in communications, especially the increasing use of the internet by all actors and

[2] Mobile Network Operators
[3] Mobile Virtual Network Operators
[4] Over The Top

the connection of all types of equipment, sensors and other objects to the Internet, are leading to an exponential increase in data generated by consumers and private and public entities.

The increasing availability of data and analytical tools is changing a large portion of the European economy, enabling innovative business models, new products and processes, cost reductions, better-informed decisions by consumers, institutions and firms, as well as providing new growth opportunities. All societies, including the European society, should ensure that firms, institutions and citizens are ready to use the vast potential of this strategic asset, whilst being cognisant of the risks and challenges it may pose and prepared to mitigate these potential downsides.

The associated challenges have raised the interest of most, if not all, public policy organisations. The reasons for the interest of BEREC and NRAs, as expressed in the public consultation launched in 2018[5], are:

- Electronic Communication Networks and Services (ECN/Ss) provide the infrastructure over which data flow. Regulatory authorities focused on these services, such as BEREC members, should be aware that infrastructure regulation can have a significant impact on the data economy.

- The data economy may be changing the competition dynamics in the ECS markets. These markets produce a great volume of data. Its availability and aggregation can be a key competitive tool. For this reason, NRAs are interested in knowing how the use and aggregation of data may change competition dynamics and how it should be considered when assessing ECS markets.

- NRAs themselves collect and use data to perform the regulatory tasks entrusted to them, and may strive for data-based improvements in their regulatory activities. Besides this, NRAs can explore how to improve the collection and publication of the data they gather while carrying out their duties.

- Lastly, while the scope of the data economy is broader than ECS markets, as the data economy comprises services not directly belonging to ECS markets, ECS and data economy markets share common competition concerns and some actors are active in both sectors. In the future, addressing potential competition concerns in the data economy might be necessary. As such, the tools, economic concepts and technical capabilities to analyse these markets, to identify potential problems and, in particular, to implement appropriate remedies, can be similar to those applied in the ECS framework. In particular, the report “Competition policy for the digital era”[6]

[5] “BEREC Public Consultation on the data economy” BoR (18) 168. October 2018. Available at https://berec.europa.eu/eng/document_register/subject_matter/berec/public_consultations/8245-berec-public-consultation-on-the-data-economy

[6] EC Report, Competition policy for the digital era, April 2019. Prepared by report by

suggests that interoperability is a tool well suited to foster the data economy and NRAs have developed skills in this area[7]. In this regard, the experience acquired by NRAs regulating ECSs and monitoring and securing net neutrality can be valuable in tackling actual and foreseeable competition concerns pertaining to the data economy.

BEREC has prepared this report with the aim of identifying issues related to the transition towards a data-driven economy in Europe that might be relevant for NRAs in the future. The report takes into account views expressed by different actors in the public consultation launched by BEREC in the fourth quarter of 2018[8].

The primary audience for this report are BEREC members that need to consider the data economy in the context of their regulatory activities. Additionally, this report details the relationship between ECSs and the data economy, and provides a general view on the areas in which NRAs and BEREC can collaborate with other bodies to better monitor any aspects of the data economy for the time being. Lastly, stakeholders and any actors involved in the data economy could also benefit from getting a general view of the role of BEREC members in the context of the data economy.

To prepare for the current report, BEREC organised several events with various stakeholders throughout 2018. In the first half of the year, BEREC held three workshops. The first two hosted experts from NRAs, the European Commission, universities and telecoms associations, where participants exchanged their experiences and views on the subject matter and expressed their opinions on the future challenges and roles for the NRAs. The third workshop, with high level participants from interested associations, the European Commission and NRAs, was devoted to an exchange of institutional perspectives on the transition to a data economy.

The report starts with a short description of the 'Data Economy' and key aspects of data itself (Chapter 3.1). It then sets out some of the important economic characteristics of data and markets in the data economy. It identifies a number of issues around the use and exploitation of data, which have an impact on the operation of markets in the data economy (Chapter 3.2). These issues are then discussed in more detail in subsequent sections. In Chapter 3.3, key characteristics of online markets are described. Afterwards, the regulatory framework is explained in Chapter 4. Chapters 5 and 6 show how ECN/Ss act as enablers of the data economy and how data could influence competition in ECN/S markets. Chapters 7 and 8 discuss the relevance and use of data by NRAs, while the report ends with an outlook towards future work in Chapter 9.

Jacques Crémer, Yves-Alexandre de Montjoye and Heike Schweitzer. Available at http://ec.europa.eu/competition/publications/reports/kd0419345enn.pdf

[7] « […] ensuring frictionless data interoperability on an ongoing basis will surpass the capacities of competition authorities. In such cases, there may, therefore, be a case for some sort of regulation – which must, at times, be sector-specific.» p74

[8] See "BEREC summary on the outcome of the public consultation on the data economy" BoR (19) 45.

Finally, it is also important to note that some NRAs have already started looking at data economy-related issues. Annex 1 provides a detailed description of the initiatives taken by NRAs with respect to building knowledge of data economy-related topics, reflecting, at the same time, the considerations regarding the increased relevance of the data economy for the sectors under their regulatory scope.

3. GENERAL INTRODUCTION TO THE DATA ECONOMY

It is difficult to be precise about a definition of the data economy and there is no generally accepted definition: the rapid pace of change in this area means that a definition that is applicable today may well be superseded in a matter of months with the introduction of new technologies. As a result, BEREC considers that – for the purpose of this document – it is more appropriate to use a broad (non-legal) description of the data economy and to discuss the activities that fall within its scope.

3.1. Description of the data economy

The term 'Data Economy' encompasses the (increase in the) availability of data, the related business opportunities, as well as the (potential) social value of the insights that can be generated. According to the EC report "Building a European Data Economy"[9], the *"data economy measures the overall impacts of the data market – i.e. the marketplace where digital data is exchanged as products or services derived from raw data – on the economy as a whole. It involves the generation, collection, storage, processing, distribution, analysis, elaboration, delivery, and exploitation of data enabled by digital technologies".* A key development in the data economy in recent years has been the increase in the variety and volume of data being generated through online activities.

The ability to collect and analyse significant volumes of data, from a variety of sources and at a rapid pace underpins the business models of a wide range of online activities. For example, the processing of data plays a very important role in the development of new healthcare, transport and leisure products and services. Data is also a critical input for the development of artificial intelligence applications. For many online services, revenue generation is based on collecting and analysing data from users in order to offer more personalised services to the users or to offer advertisers the ability to target potential customers more precisely. The ability to collect, process, analyse, store and combine large and complex datasets can be an important or sometimes decisive competitive advantage[10].

The data economy is different from the digital economy. The digital economy encompasses transactions that are facilitated via digital means: data is not exchanged as the product or service itself, but information and communications technologies (ICT) enable or improve the efficiency of the transaction. By contrast, in the data economy, companies, and in particular

[9] 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" {SWD(2017) 2 final. Brussels, 10.1.2017 COM(2017) 9 final

[10] See "Competition policy for the digital era", p. 9. and p. 101 ff.

platforms, use consumer data to create revenue-generating opportunities.[11] Data is the most relevant production factor.

The EC stated that the value of the data economy in the European Union was more than €285 billion in 2015, representing over 1.94% of EU GDP. Accordingly, favourable and timely policy and legislative conditions and incentives to invest in ICT might support an increase of the value of the European data economy to €739 billion by 2020, representing 4% of overall EU GDP[12].

Different types of Data

Data can be categorised in several ways. The data categories are influenced for example by volume, velocity, variety and veracity[13]. For instance, the volume of data may be important when looking to identify patterns in consumer behaviour at the aggregate level. Conversely, the velocity of data – that is, how quickly data is collected and processed – will be more relevant to services promoting products based on what users are currently searching.[14] Variety means that data from many different sources are used, leading to heterogeneous datasets, while veracity stands for the integrity and the meaningfulness of the data, which could be of less quality if the data is incomplete, inconsistent or untrue.

For example, data could be distinguished in the categories:

- Between **personal and non-personal data**, as being made in the GDPR. The GDPR limits access to personal data of others.

- Between **public** (research funded with public money) **and non-public (proprietary) data**. The EC PSI Directive, which aims to facilitate the creation of a common data space in the EU, will provide a better insight into the boundaries between public (freely available) and private data[15].

- The report on "Competition policy for the digital era"[16] further differentiates between **volunteered**, **observed and inferred data**, as well as between **historical** and **real-time data access**.

[11] E.g. Google uses the search results of its users to gather data about their behaviour online and gain insights into user personality and preferences. This is then use to sell targeted advertising opportunities to companies. By targeted ads, firms can reduce costs to acquire interested consumers.
[12] https://ec.europa.eu/digital-single-market/en/towards-thriving-data-driven-economy 25th of April 2018.
[13] For instance, see "Big data: Interim report in the context of the joint inquiry on Big data" launched by the AGCOM deliberation No. 217/17/CONS.
[14] The rate at which the relevance of data depreciates and the costs involved to acquire data will also be relevant factors. See for instance Oxera, (2018) "Data in Digital Markets", available at: https://www.oxera.com/wp-content/uploads/2018/10/Data-in-digital-markets.pdf.
[15] https://ec.europa.eu/digital-single-market/en/open-data
[16] Ibid footnote 3

Having raised this issue, BEREC considers that the dividing lines between different types of data are not always clear-cut and combinations are possible. This also emerged from the outcomes of the public consultation, where no consensus emerged. Moreover, making the distinctions in practice might not always be straightforward, as the relevance of a specific taxonomy depends on its purpose.

3.2. Economic characteristics of data

Data is heterogeneous

The various types of data mentioned in Chapter 3.1 have distinct values to different types of businesses because the value of data will depend on its context. Data is heterogeneous by nature and the value of data ultimately depends on the ability for producers and consumers to generate insights and products.

Scale of data can be important

As also referred to above, data is an important input to many newly emerging services and, at the same time, more and more data is being generated by online activities. However, it is hard to assess the value of an individual data point. It might be that a single data point has a negligible value by itself, but that data will start generating added value when a significant amount of information is merged, processed and structured in a meaningful manner. Insights derived from data, and thus its value, depend on the quality and reliability of data, as well as the ability to combine that data with other datasets. Algorithms need access to data in order to work well and to update themselves: for instance, the more queries on a search engine, the more data the underlying search algorithm will have to learn from and the more accurate its search results will be. Machine learning and AI applications, in particular, depend on access to large datasets.

Data is non-rivalrous in consumption

Raw data is generally ***non-rivalrous*** in consumption. That is, the same data about a consumer can be made available to many different companies, rather than only being used by a single firm.

However, even though data is non-rivalrous, that does not mean that it is non-exclusive: that is, firms can be prevented from having access to the raw data. For example, some types of data may be specific to a particular platform and can thus be made *exclusive* through commercial or technical means or can simply not be made available to third parties. Exclusive access to data can provide firms with an important competitive edge in terms of providing insights into consumer behaviour and this exclusiveness will provide an important incentive to invest into data collection and analysis. However, at the same time, exclusive access to data can give rise to concerns about the exercise of market power. There is an

ongoing debate[17] about how to address this tension between static and dynamic effects in relation to access to data and datasets.

As a result of these characteristics, data can, on the one hand, be a valuable input for new activities, providing means to innovate and spurring competition. On the other hand, data that is held exclusively by firms with large scale and network advantages could have negative consequences for the data economy.

3.3 Online competition and the data economy

Many online businesses can be analysed as "two-sided markets", where the platform acts as an intermediary to bring users from different groups or 'sides' of a market together (transaction platform) or to bring different markets together (non-transaction platform), thus facilitating transactions or interactions that might otherwise not have taken place because of high transaction costs. In addition, the platform sets two different "prices" to the two types of intermediated actors (e.g. collecting data on one side and setting a monetary price on the other).

Platform markets

Two-sided markets are not a new or online-specific concept: for example, broadcasting platforms bring into contact two types of agents – advertisers and viewers. However, the emergence of a data economy with the development of the internet and OTT services has led to a proliferation of new, online platforms. Online platforms reduce transaction costs for consumers and reduce the costs of acquiring customers for firms: e.g. price comparison websites for broadband services, hotel booking sites, etc.

Platform markets may cover a wide range of different products and services, but they share many of the economic features of communications services, which in turn influences how competition operates in platform markets:

- ***Direct and indirect network effects***

The way in which data is used and monetised by firms can lead to ***network effects***. For instance, there can be **direct network effects**, where the benefits to a user increase as the number of users increase (e.g. social networks and messaging services). An increase in the number of users of a platform on one side of the market increases the value of the platform for other users (on the same side of the market). These effects can also be associated with "user feedback loops"[18]: the more users a platform has, the more the data about those users or their activities can be utilised to sell targeted advertising or to provide better services,

[17] See for example, Sivinski, G., Okuliar, A. & Kjolbye, L. (2017). "Is Big Data a Big Deal?" European Competition Journal [Online] Available at: https://www.tandfonline.com/doi/full/10.1080/17441056.2017.1362866 which sets out a framework for thinking about the competitiveness of data.

[18] Big Data and Competition Policy: Market power, personalised pricing and advertising , at: http://cerre.eu/sites/cerre/files/170216_CERRE_CompData_FinalReport.pdf

which in turn can increase the number of users, which in turn can generate even more data to be collected.

One of the other key features of platforms is the existence of indirect network effects or cross-group effects. These effects occur when the benefits to users on one side of a platform increase with the number of users on the other side of the platform. These effects can be associated with "monetisation feedback loops". For example, in the case of targeted advertising, as more users engage with a service or online platform, the more data is collected by that service provider or platform, allowing it to offer better targeted advertising, which raises the likelihood that users will engage with the ads that are shown to them. This may attract more advertisers and further increase the revenue earned by the service, allowing the service provider to invest in its ability to improve the service and attract more users, allowing the cycle to continue.

Strong direct and indirect network effects make it very hard for a competitor, regardless of how good or bad their service is in comparison[19], to compete directly, especially when there are switching barriers. This can result in "winner-takes-all" outcomes[20], sometimes referred to as "tipping markets". A new competitor needs to coordinate the joint switching of users in order to create the same level of network effects.

- ***Economies of scale***

The cost profile of online platforms is often characterised in terms of high fixed costs and very low variable costs. The marginal cost of collecting data can also be low (if not negligible), which means that significant *economies of scale* can be present.

At the same time, platform markets also have features that are not typical for traditional communications services.

- ***Economies of Scope***

Online platforms with appreciable network effects can also enjoy economies of scope by using the information from the data streams generated by the activities of their clients on the different sides of the platform in other services that they provide, leading to a reduction in costs or an increase in service quality. For instance, a platform can improve not only the performance of a service offered on one side of the platform, but also develop auxiliary services or even new business streams by analysing the data collected on the other side of the platform.

- ***Asymmetric pricing***

[19] This has been referred to as the "incumbency advantage" in a recent report prepared by an expert panel for the European Commission. See footnote 3

[20] See for example *Competing with Big data*, Prüfer, 2017: https://pure.uvt.nl/ws/portalfiles/portal/15514079/2017_006.pdf

One side of the platform may offer services at below cost (or even at no charge) to the other side in order to attract more users on that side of the platform[21]. With regard to such markets, the cost on one side cannot be directly linked to revenues on the same side of the market.

- ***Linked ecosystems***

Because many of the largest players in the data economy are vertically integrated, horizontally integrated and/or conglomerates, extensively covering the online "value chain", they connect many online markets and form ecosystems. This means that large players can combine data from several markets, leading to data sets that enable specific insights that cannot easily be replicated.

Ecosystems may raise barriers to entry if the established ecosystem providers integrate complementary services without making them interoperable with alternative offers, thereby often requiring potential rivals to offer a similarly wide range of services to compete for consumers[22]. In the end, switching costs for consumers and thus barriers to entry increase. Market power in the supply of certain services might also be related to exploitative acquisition of additional data[23].

Other factors which can affect the functioning of online markets

Besides concerns about market power, online markets can be affected by other forms of market challenges, which in turn can (directly or indirectly) lead to consumer harm and should be considered in competition analyses:

- **Informational asymmetry**: consumers may not have all the relevant information that would be required for making optimal choices about choosing which service to use. This can lead to imperfect choices. For example, they may lack relevant information on what data are being collected from them and for what purposes. In the absence of such information, users who value privacy may not choose their services appropriately.

- **Behavioural bias**: consumers' decision-making can be biased, potentially leading to imperfect choices. For example, the value some consumers place on privacy can appear inconsistent with the extent of data they share in exchange for free services –

[21] See *Platform competition in two-sided markets*, Tirole and Rochet, 2003.
[22] For instance, mobile operating systems may be offered alongside several compatible services (geolocation, messaging, search engines) that are very popular. A competing operating system could have to also offer equivalent services to attract users.
[23] See for example the recent decision of the German Bundeskartellamt on Facebook at https://www.bundeskartellamt.de/SharedDocs/Meldung/EN/Meldungen%20News%20Karussell/2019/07_02_2019_Facebook.html

the so-called 'Privacy Paradox[24]'. Consumers also find it difficult to trade off the immediate benefits of accessing a 'free' service (e.g. social media) with longer-term costs (e.g. the risk of a data breach and the associated costs from identity theft) [25].

- **Externalities**: consumers and/or providers may not always consider the impact of their actions on the wider society. For example, online providers may underinvest in data protection if they do not sufficiently account for the cost to society if their data depositories are hacked.

- **Zero-price markets**: Services are often provided for free in exchange for personal data[26]. Besides privacy issues, this can also require a specific analysis of consumer harm for the application of competition law.

As a result of a combination of the above factors, concerns have been raised across the globe recently about the power of online platforms. Initiatives has been launched in a number of countries (Germany[27], Australia[28], the UK[29], the Netherlands[30] and the US[31], among others) and by a number of regulatory authorities to produce reports to analyse these issues and begin to assess whether they justify action from regulators. Of particular importance in this context, is the recently published report by an expert panel of academics for the European Commission on "Competition policy for the digital era"[32]. This report proposes the adaption and refinement of competition enforcement, including shifting the

[24] See for example "A privacy paradox: Social networking in the United States", Susan B. Barnes, 2006.
[25] Crémer, Montjoye & Schweitzer (2019) claim that biases towards the default option and for short term gratification should be considered in market power assessments. See footnote 3
[26] See OECD (2018). "Quality considerations in digital zero-price markets" Available at: https://one.oecd.org/document/DAF/COMP(2018)14/en/pdf
[27] Competition policy: The challenge of digital markets, at: https://www.monopolkommission.de/images/PDF/SG/s68_fulltext_eng.pdf, Facebook, Exploitative business terms pursuant to Section 19(1) GWB for inadequate data processing, at: https://www.bundeskartellamt.de/SharedDocs/Entscheidung/EN/Fallberichte/Missbrauchsaufsicht/2019/B6-22-16.pdf?__blob=publicationFile&v=3 and Modernising the law on abuse of market power, at: https://www.bmwi.de/Redaktion/DE/Downloads/Studien/modernisierung-der-missbrauchsaufsicht-fuer-marktmaechtige-unternehmen-zusammenfassung-englisch.pdf?__blob=publicationFile&v=3
[28] ACCC, (2018). "Digital Platforms Inquiry: Preliminary Report" Available at: https://www.accc.gov.au/system/files/ACCC%20Digital%20Platforms%20Inquiry%20-%20Preliminary%20Report.pdf
[29] House of Lords (2019). "Regulating in a digital World" House of Lords, Select Committee on Communications Available at: https://publications.parliament.uk/pa/ld201719/ldselect/ldcomuni/299/299.pdf and "Unlocking Digital Competition" Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/785547/unlocking_digital_competition_furman_review_web.pdf
[30] ACM launches investigation into abuse of dominance by Apple in its App Store, at: https://www.acm.nl/en/publications/acm-launches-investigation-abuse-dominance-apple-its-app-store
[31] New FTC task force to tackle competition in tech sector, at: https://www.ft.com/content/2801ced2-39f7-11e9-b856-5404d3811663
[32] Ibid footnote 3

burden of proof (in some circumstances), more stringent data portability and stricter merger control.

4. REGULATORY FRAMEWORK AND COMPETENT AUTHORITIES FOR THE DATA ECONOMY

The worldwide rise in data collection[33] and the strategic use of data has promoted changes in the institutional landscape by empowering some regulators and, more generally, public bodies with new regulatory responsibilities and tools or by inducing them to analyse new practices, issues and emerging markets.

4.1. Regulatory framework for the data economy

The relevant regulatory framework for the data economy in Europe touches upon several existing EU directives and regulations (which are currently applicable or will enter into force shortly) and corresponding national laws, as well as legislative initiatives by the European Commission. The table and description below offer a non-exhaustive overview of this regulatory framework. Overall, existing data-related regulation, be it in the form of soft or hard law, aims to set the conditions for a secure, fair and transparent data-driven ecosystem. The new challenges posed by the data-driven economy are heterogeneous; they range from the need to continue protecting fundamental rights (e.g. the right for privacy) to the need to enhance the competitive development of markets and adequate consumer protection.

There are several regulatory initiatives that update and adapt existing pieces of legislation to the new data economy. On a pan-European level, this is the case for the data protection laws, the Telecoms Package, and the Cybersecurity Act. Other initiatives are newer and more strictly related to the new business models/opportunities and value chains launched by the data economy, i.e. the P2B online platform Regulation, or the PSI Directive (see next table). Further, some Member States, for instance Germany, have also already updated their competition law.

Table 1 – Overview of the regulatory framework applicable to the data economy

[33] In 2013, IBM estimated that 90% of the data in the world were created in the last two years, see https://www.ibm.com/blogs/insights-on-business/consumer-products/2-5-quintillion-bytes-of-data-created-every-day-how-does-cpg-retail-manage-it/

Legal provision	No / status	Competent Authorities
General Data Protection Regulation (GDPR)	Regulation EU/2016/679	Data Protection Authorities (DPAs)
Sector specific privacy protection (ePrivacy Directive) Will be replaced by ePrivacy Regulation	Directive 2002/58/EC Draft Regulation	Currently diverging competences across Europe, depending on the Member State (NRAs, DPAs etc.)
General competition law	Articles 101-109 TFEU, EC Merger Regulation 139/2004 and corresponding national laws	EC and National Competition Authorities
EU Telecommunications Policy Package	Directives: 2002/19/EC 2002/20/EC 2002/21/EC 2002/22/EC Applicable until transposition not later than December 2020	National Regulatory Authorities (NRAs)
European Electronic Communications Code (EECC)	Directive EU/2018/1972 Applicable from December 2020	National Regulatory Authorities and other Competent Authorities, subject to Member States' designation
P2B (online platform) Regulation	Proposed regulation. Political agreement reached.[34] COM (2018) 238[35], adopted on 26 April 2018	To be determined.
E-commerce (B2C and B2B) and intermediaries' liability regime.	Directive 2000/31/EC	Member States ensure protection
Open data and PSI Directive	Draft Revision of PSI Directive 2003/98/EC already revised by Directive 2013/37/EU – 2017 public online consultation	EU, Member States
Free flow of non-personal data	Regulation 2018/1807 of 14 November 2018[36] Guidance on the Regulation on a framework for the free flow of non-personal data in the European Union, adpted on 29 May 2019.	EU, Member States
Database Directive	Directive 96/9/EC Evaluation report on the Database	Member States ensure compliance

[34] See: http://europa.eu/rapid/press-release_IP-19-1168_en.htm
[35] See http://ec.europa.eu/transparency/regdoc/rep/1/2018/EN/COM-2018-238-F1-EN-MAIN-PART-1.PDF
[36] Final text to be published. Currently adopted text can be found here http://www.europarl.europa.eu/sides/getDoc.do?type=AMD&format=PDF&reference=A8-0201/2018&secondRef=047-047&language=EN

	Directive published on the 25 April 2018 (see text below)	
Cybersecurity	Cybersecurity Act adopted on 9 April 2019[37]	ENISA and respective national cybersecurity authorities
Digital Content Directive (DCD)	Proposed directive COM (2015) 634[38]	Member States ensure compliance

General Data Protection Regulation (GDPR) and sector specific privacy protection (ePrivacy Directive)

The GDPR is one of the key pieces of data-related legislation that defines the legal boundaries of personal data processing. Hence, it contains a set of basic requirements to which, in principle, all subjects active in the personal data economy must be compliant. By contrast, the ePrivacy Directive, which is currently under review, has a more selective and focused scope, insofar as it prescribes specific safeguards addressed to electronic communications content and electronic communications metadata.[39]

General competition law

As for every economic sector, general competition law applies to the data economy, either by penalizing abusive conduct or through merger control. Furthermore, competition law has sector inquiries as a specific instrument to analyse and significantly influence specific markets through *ex post* measures[40]. However, *ex post* competition law is focused on cease and desist orders, but not on implementing regulated access aimed to prevent competition problems. Additionally, in some cases, such *ex post* intervention may not keep up with the fast changing issues related to the data economy.

It is interesting to also mention that, according to the report "Competition policy for the digital era", competition policy might be overburdened[41] with interoperability and access obligations.

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[37] The text can be found here: https://data.consilium.europa.eu/doc/document/PE-86-2018-INIT/en/pdf. The regulation shall enter into force on the twentieth day following that of its publication in the OJEU.

[38] See http://www.europarl.europa.eu/RegData/docs_autres_institutions/commission_europeenne/com/2015/0634/COM_COM(2015)0634_EN.pdf

[39] For the interplay between the GDPR and the e-privacy Directive, see EDPB, Opinion of the board 5/2019 https://edpb.europa.eu/sites/edpb/files/files/file1/201905_edpb_opinion_eprivacydir_gdpr_interplay_en_0.pdf

[40] See for example, the sector inquiry of the Bundeskartellamt on online advertising, https://www.bundeskartellamt.de/SharedDocs/Publikation/EN/Pressemitteilungen/2018/01_02_2018_SU_Online_Werbung.html?nn=3591568. More in general, with regard to antitrust practice, see table 4, 5 and 6 in Annex 2.

[41] See page 74: "*In other settings, however, duties to ensure data access – and possibly "data interoperability" – may have to be imposed. While the general criteria for doing so can be taken from Article 102 TFEU, ensuring frictionless data interoperability on an ongoing basis will surpass the capacities of competition authorities. In such cases, there may, therefore, be a case for some sort of*

EU Telecommunications Policy Package

The directives contained in this policy package are impacted by the data economy, but also have a relevant impact on some stakeholders of the data economy (see Figure 1).

ECS providers, which are also participants in the data economy, are subject to the obligations under these directives, e.g. through transparency and access obligations or provisions for the protection of end-users.

However, former OTT-1 and OTT-2[42] providers, such as number-independent messenger services or online platforms, are out of the scope of these directives. A question can arise about the competitive advantage derived from this difference in the case where OTT providers compete with ECS providers – these issues are developed in section 6.

European Electronic Communications Code (EECC)

The same question applies to the new EECC directive, except that OTT-1 providers now qualify as ECS providers as well. Thus, OTT-1 providers have to comply with specific rules from the EECC (e.g. regarding several of the provisions for the protection of end users). In this regard, the impact of the EECC on the data economy has widened compared to the EU Telecommunications Policy Package (see figure 1 below). In justified cases, competent authorities may oblige providers of interpersonal communications services to make their services interoperable[43].

Platform to Business Regulation

The Regulation on transparency in platform-to-business relations covers, amongst other things, online e-commerce market places, online software application stores, online social media and general search services. This regulation aims to tackle the issue of transparency problems regarding B2B relationships, which are intermediated by a small number of large platforms. Examples of this include unclear delisting, risk of discrimination, excessive data collection and – with respect to general search services – unclear ranking criteria. These problems were insufficiently addressed by sectoral regulation (Directive 2005/29/EC on Unfair Commercial Practices and Council Directive 93/13/EEC on Unfair Contract Terms).

E-commerce (B2C and B2B) and intermediaries' liability regime.

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regulation – which must, at times, be sector-specific. When it comes to ensuring access to data for the purpose of promoting AI in general in order to foster innovation – i.e. a form of data access that is unrelated to the business activity of the data controller – we believe that a legal regime outside of competition law will be needed."

[42] See the BEREC report on OTT services (BoR (15) 142) for this classification, available at https://berec.europa.eu/eng/document_register/subject_matter/berec/reports/5751-berec-report-on-ott-services

[43] Art 61(2) b EECC

The Electronic Commerce Directive[44] sets up a framework for electronic commerce in Europe and provides legal certainty for businesses and consumers alike. The Directive establishes harmonised rules on issues such as the transparency and information requirements for online service providers, commercial communications, electronic contracts and limitations of liability of intermediary service providers. In the context of the Digital Single Market Strategy, the European Commission is supplementing this Directive with several initiatives, aiming to enhance the development of a European Single Market and to promote competition in the digital markets.[45]

Open government data policies and PSI Directive

Open data policies are intended to promote the extraction of value from the availability of publicly-owned data, which can be used, re-used and distributed. In Europe, both the Commission and Member States are enacting open data policies for data produced or commissioned by themselves and/or by other public entities. As a result, apart from establishing open data portals, most EU and national public bodies are developing applications and services to allow smart use of public open data and/or to facilitate opportunities to select, exploit and, extract value from such data. The final aim of these policies is not only to reduce costs for performing governmental and public functions, but, primarily, to help businesses to create value and to promote innovation. Indeed, the EU open data market is a key driver of the European data economy.

Currently, one of the legislative pillars, the EU Directive on the re-use of public sector information, also known as the 'PSI Directive' (Directive 2003/98/EC already revised by Directive 2013/37/EU), is under review: proposal COM (2018) 234[46], adopted by the European Commission on 25 April 2018, is the subject of discussion with the European Parliament and the Council[47]. It requires:

1) information to be made openly available at a price no higher than marginal costs as a default rule;
2) information and metadata to be made available in machine-readable and interoperable data formats wherever possible; and

[44] Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market.
[45] For instance, Regulation (EU) 2018/302 of the European Parliament and of the Council of 28 February 2018 on addressing unjustified geo-blocking and other forms of discrimination based on customers' nationality, place of residence or place of establishment within the internal market and amending Regulations (EC) No 2006/2004 and (EU) 2017/2394 and Directive 2009/22/EC (available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32018R0302) or Proposal for a Directive on certain aspects concerning contracts for the supply of digital content (available at https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1450431933547&uri=CELEX:52015PC0634).
[46] See the draft text here: https://eur-lex.europa.eu/resource.html?uri=cellar:4e790e4c-4969-11e8-be1d-01aa75ed71a1.0001.02/DOC_1&format=PDF
[47] The full text can be found here: https://eur-lex.europa.eu/resource.html?uri=cellar:4e790e4c-4969-11e8-be1d-01aa75ed71a1.0001.02/DOC_1&format=PDF; for the revision process see https://ec.europa.eu/digital-single-market/en/proposal-revision-public-sector-information-psi-directive

3) all legally public documents to be re-usable for commercial or non-commercial purposes.

The total direct economic value of public sector information in the European Union is expected to increase from a baseline of EUR 52 billion in 2018, to EUR 194 billion in 2030[48].

Free flow of non-personal data

In November 2018, Regulation 2018/1807[49] on the free flow of non-personal data[50] was adopted, with the aim of removing obstacles to data mobility in the Union. It complements the legal framework on the protection of personal data. The EC has also published guidance on free flow of non-personal data[51] that aims to clarify which rules apply when processing personal and non-personal data

Database protection

The Database Directive tries to strike a balance between the legal protection of databases and free access and re-use of their content. The aim is twofold, in one part to promote investment in setting -up and updating databases, and in another part to promote the development of a free and consistent information market within the Union. It provides rules for lawful and unlawful access and it applies in cases where copyright law is not applicable. Given the importance of software development in the data-driven economy, it has to be specified that software is usually protected by copyright as a literary work, although it may attract protection under the Database Directive when developed in modular form. The Database Directive is currently under review. The last step of the revision process is the Synopsis report, released in April 2018[52].

Cybersecurity

EU Cybersecurity law lays down general security obligations to anyone providing electronic communications services or networks or processing personal or electronic communications data. The rationale is to contribute to the growth of trust, to the benefit of market operators, businesses and retail consumers, as well as citizens, whose fundamental rights are increasingly affected by online exposure and digital identity. In Europe, the EU Cybersecurity Act, adopted on 9 April 2019[53] provides the main framework for promoting cybersecurity, deterrence and resilience. It is complemented by pieces of hard and soft law, such as the

[48] See https://ec.europa.eu/digital-single-market/en/proposal-revision-public-sector-information-psi-directive

[49] See https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018R1807&from=EN

[50] Examples of non-personal data include aggregate and anonymised datasets used for big data analytics, data to manage industrial machines, etc.

[51] "Guidance on the Regulation on a framework for the free flow of non-personal data in the European Union" Brussels, 29 May 2019. Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2019:250:FIN

[52] https://ec.europa.eu/digital-single-market/en/news/synopsis-report-public-consultation-evaluation-directive-969ec-legal-protection-databases

[53] See https://ec.europa.eu/commission/news/cybersecurity-act-2018-dec-11_en

Commission Recommendation on the Cybersecurity of 5G networks[54] and the forthcoming Commission guidelines on the interaction with the GDPR.

Digital Content Directive

The proposed Directive applies to contracts for the supply of digital content (computer programmes, mobile apps, social media services, cloud computing). It intends to strengthen consumers' protection across the EU by ensuring conformity of the digital content with the related contract. The issue of consistency with sectoral regulation and the GDPR has been debated in more than one forum.[55]

4.2. Authorities involved in the data economy

In the context described above, the following public stakeholders are currently involved:

- **Competition authorities** (application of competition law). Tables 2, 3 and 4 in Annex 2 show the main relevant cases dealt with by DG COMP and the NCAs (national competition authorities);
- **Data protection authorities** (application of the GDPR and, in some cases, the ePrivacy Directive);
- **Electronic Communications National Regulatory Authorities (NRAs)** (regulation of the telecoms market and application of the ePrivacy Directive (Germany, the Netherlands) (see section 4.3 for more details);
- **Cybersecurity authorities** (application of the EU cybersecurity framework);
- **Governmental offices** promoting open data policies/information fairness. For example, AgID in Italy[56], Etat Lab in France[57], IVPK in Lithuania[58] and the Information Commissioner's Office in the UK. [59]

4.3. BEREC and NRAs' role

Regarding more specifically the case of NRAs, the regulatory framework for the data economy transcends the scope of typical NRAs' responsibilities, even though part of NRAs' competences is influenced by the data economy. The following figure depicts the services in the scope of the data economy in relation to the future competences of NRAs according to the EECC.

[54] https://ec.europa.eu/digital-single-market/en/news/cybersecurity-5g-networks
[55] http://www.europarl.europa.eu/RegData/etudes/BRIE/2017/608748/EPRS_BRI%282017%2960874 8_EN.pdf
[56] See https://www.agid.gov.it/
[57] See https://www.agid.gov.it/ See https://www.etalab.gouv.fr/
[58] See https://ivpk.lrv.lt/en/
[59] See https://ico.org.uk/

Figure 1: Services in the scope of the data economy related to the telecommunications sector

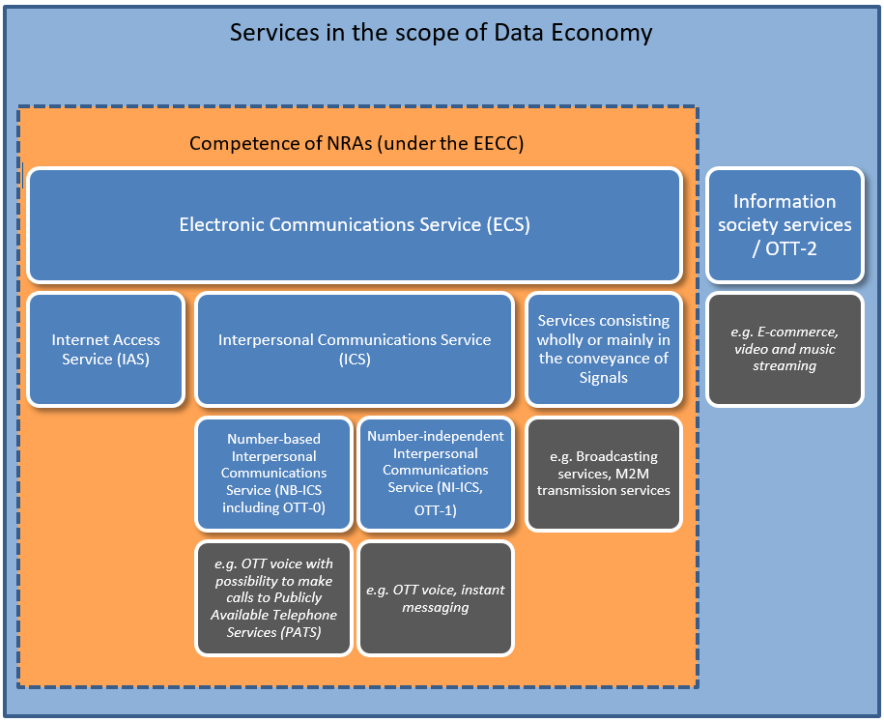

Figure 1 shows that online platforms currently lie outside of NRAs' competences stemming from the EECC. Nevertheless some NRAs have national competences going beyond the competences bestowed upon them by the EECC and some NRAs have already started monitoring services linked to the data economy (for instance in Italy, Agcom monitors some data economy services and compiles an internal database named IES – Informativa economica di sistema). Others consider the context of innovation and platforms (e.g. ACM). Besides, some ECS operators are involved in the data economy in different ways – they can be horizontally or vertically integrated with Information Society services, they can bundle ECS services with other data economy services and they can use data gathered from their ECS activities to compete in ECS or other markets. Data can also be a (partial) payment for telecoms services. All these circumstances can make it relevant for NRAs to monitor data economy markets.

The specific role of ECSs and their regulation in the context of the data economy is further elaborated upon in the following sections.

5. ECSs AS ENABLERS OF THE DATA ECONOMY

5.1. ECS providers establishing the infrastructure for the data economy

ECSs are an enabling factor for the data economy, as they normally provide the infrastructure upon which the data economy is developing. Ubiquitous, reliable, interoperable and secured high-speed transmission networks and services facilitate the collection of data everywhere. Therefore, the development of ECSs both directly and indirectly supports the growth of the data economy.

Connecting end-users

Connectivity has to be provided for data to be generated and collected. In some sparsely populated areas, there is no connectivity at all, which makes the collection of online data impossible. In densely populated areas, the existing connectivity may need to be improved in terms of bandwidth and other parameters in order to further support the data economy.

Connecting machines[60]

Data generated by machines is an essential part of the data economy. For instance, in the case of connected cars, some vehicle-related data are only valuable as long as they are collected and processed with a short delay (e.g. alternative route processing based on traffic data). A prerequisite for connected cars to thrive is therefore that roads and highways are appropriately equipped with broadband infrastructure.

Other scenarios relying on the Internet of Things and M2M assume that sensors will be able to upload data that could be used by other automated devices or could just provide valuable insights to users.[61] For instance, sensors can be attached to animals or plants to keep track of their condition or growth.

Upcoming developments of the networks: what 5G may change

Compared to 4G, 5G promises to offer more capacity, bandwidth and shorter delays, which could fuel new use cases and therefore generate more data to collect. In general, the changes will be evolutionary, as the technology and its use cases will develop over time.

5G is expected to enable so-called "sliced" networks, allowing existing (mobile) virtual network operators ((M)VNOs) and other actors to improve control over the allocation of resources. They may even offer subscription plans to car owners to provide them exclusive bandwidth resources. Therefore, network slicing provides an opportunity for actors in the data economy to have a fully integrated service offer[62].

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[60] In the BEREC report "Enabling the Internet of Things", the following classification is made:

- Typically, an IoT user who includes connectivity as an input product into his products or services does not seem to provide an ECS when selling a connected device or "smart" service (unless he wholly or mainly resells connectivity to his customers). In this case, the IoT user is similar to a producer and/or vendor of terminal equipment.

- Vice-versa, a reselling situation – and hence ECS – may be found at the level of the IoT user when the IoT user is contractually liable vis-à-vis the end-user for the provision of connectivity and this constitutes a whole or main part of what is sold.

[61] See "Study on Cellular Internet of Things (CIoT) support and evolution for the 5G System (5GS", 3GPP TR 23.724 V16.0.0 (2018-12) for the envisaged enhancements.

[62] In Germany, for example, there will also be regional frequency assignments for new industrial users to install their own internal mobile networks.

5.2. ECS providers' infrastructure creating valuable data

In some instances, the infrastructure may generate data itself. For example, most indoor location data are generated using ECS providers' networks if there is high density of radio cells or when it is combined with other wireless technologies, such as WiFi or Bluetooth, while satellite-based positioning systems (e.g. GPS or Galileo-based technologies) offer accurate outdoor positioning. In this context, the ECS providers may either process the positioning data themselves, they may act as pure enablers of the data economy if they do not collect the data for their own use, or they could give access to these data to third parties[63]. 5G might significantly enhance the mobile-based positioning system and offer various enhanced use cases.[64]

Having access to these data, mobile operators have also developed tools and algorithms to estimate users' locations and movements on an aggregated, anonymised level, as well as the density of population in different areas. Such data could be used by urban planners to identify high density areas where public transportation development should be prioritised[65].

More generally, cooperation between ECS providers and other actors can help create valuable data. For example, some ECS providers (e.g. Orange and SFR) are part of a consortium which also includes news publishers and actors from the ad-tech industry. The objective of the consortium is to provide reliable, fine-grained data and a large audience to target. To such consortiums, ECS providers can contribute Customer Relationship Management (CRM) data (i.e. home location and socio-demographic data) provided that users have given their consent. In the UK, ECS providers also use this data for analytics and marketing purposes.[66] Unlike content data, this data may not have to be aggregated and, assuming that customers have consented, can be processed as such.

Another example of cooperation between telecommunications companies and other sectors is the development of smart home solutions. For example, a combination of relevant data with external information, such as weather data, can allow a heating system to respond to the current weather conditions. Developing smart home platforms therefore requires cooperation between companies from a wide variety of sectors. For the integration of the necessary sensors, actuators and other household appliances, such as washing machines, compatibility has to be ensured.

5.3. Position of the ECS providers in the data economy value chain

Some telecommunications network providers already offer services (for example, cloud data storage services[67]) which actors in the data economy can use to develop their business.

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[63] End user equipment already strongly relies on positioning information.
[64] See "Study on positioning use cases", 3GPP TR 22.872 V16.1.0 (2018-09)
[65] See for example "*A spatial econometric model for travel flow analysis and real-world applications with massive mobile phone data"* Linglin Ni, Xiaokun (Cara) Wang, Xiqun (Michael) Chen. Transportation Research Part C: Emerging Technologies. Elsevier, January 2018.
[66] See O²'s Weve
[67] For example, Orange proposes cloud services:

ECS providers may in particular benefit from their proximity to end-users and the density of their infrastructure to offer low latency cloud services. The development of Network Function Virtualization will make the network infrastructure more agile and could be used to offer new types of cloud services at the edge of the network. For instance, unused gateways or switches could be reconfigured to offer computing resources.

Furthermore, according to the EECC, ECS providers have to comply with regulatory requirements, notably in terms of competition and reliability, which have also been identified by stakeholders as key parameters of the data economy in the responses to the BEREC´s consultation on the data economy. ECS providers could capitalise on their reputations as a key differentiator in the market of cloud service providers and, in the long run, in the data economy market in general.

5.4. The role of Interpersonal Communications Services as a specific type of ECS in the data economy

ECS Providers that do not provide internet access, such as Interpersonal Communications Service Providers[68] (ICS-Providers), also have an important role in the data economy. They allow the collection of data related to personal information of internet users. Many 'Number-Independent Interpersonal Communications Services (NIICS) are provided without a monetary payment, but require the user to pay, for example, in terms of personal data or attention. The content of communications can be protected by encryption and therefore not be processed. Nonetheless the metadata and especially the personal information that can be derived from the use of NIICS can be processed (within the limits allowed by privacy regulation) and permit the development of specific services, such as targeted advertising. In such cases, NIICS enable the data economy by creating channels through which businesses can reach their customers.

Moreover, mobile phone numbers are a rather stable customer identifier – notably thanks to number portability. They can therefore be used to consolidate data collected from different sources about a given individual. Even NIICS may collect the phone number of users for security purposes (e.g. as a second authentication factor) to limit the number of accounts per individual or just to target advertisements. Hence, ECS providers play a critical role in the data economy regarding the provision of a reliable identifier used to exchange data and to limit the proliferation of false data.

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https://www.orange-business.com/en/solutions/cloud-computing

[68] According to the European Electronic Communications Code, 'interpersonal communications service' refers to a service normally provided for remuneration that enables direct interpersonal and interactive exchange of information via electronic communications networks between a finite number of persons, whereby the persons initiating or participating in the communication determine its recipient(s) and does not include services which enable interpersonal and interactive communication merely as a minor ancillary feature that is intrinsically linked to another service.

Another example is the “Data For Development” (D4D) challenge, which highlights some potential uses of the Call Data Record (i.e. data generated by ICS providers) in projects with a high social impact (e.g. detecting events and communities[69]).

6. ECS COMPETITION IN DATA-DRIVEN MARKETS

Having considered the effects that ECS can have on the development of the data economy, the reversed question of the impact of the data economy on the ECS markets can also arise. Indeed, data are increasingly used to improve existing business models and processes in the telecommunications sector. On top of this, data collection and analysis are also often the basis for the development of new business models and cross-sector cooperation.

6.1. Relevant type of data in the electronic communications sector

Firstly, there are different types of data that can be relevant in the case of the telecoms sector.

For example, data are of great relevance in optimising the network operations of telecommunications companies. Data-based analyses could help to make network operations more efficient[70]. Data from the network infrastructure can also be processed to anticipate equipment malfunctioning and implement a “predictive maintenance policy”.

Customer loyalty and churn behaviour are also examined with data analytics methodologies. The aim is, for example, to detect the reasons for a termination of contract and, based on these findings, to prevent future terminations. Data from different sources have to be brought together and analysed for this purpose.

Another use case where data analytics could help to optimise business operations is fraud detection.

The introduction of IPTV also opens up new opportunities for ECS providers to conduct data analysis in comparison to conventional TV reception via satellite or terrestrial TV. Preferred functions, consumed content and switching behaviour can be evaluated in real-time[71] (within the limits allowed by privacy regulation).

Annex 3 includes a first approach to establish a taxonomy of data in the context of the telecommunications sector.

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[69] See for example «Multi-perspective Analysis of Mobile Phone Call Data Records: a Visual Analytics Approach », Gennady Andrienko, Natalia Andrienko, Georg Fuchs, 2015.

[70] For example, during a call mobile network providers continuously monitor and adapt the transmission power of the cell phone and the base station to use only as much transmission power as needed for the call. This saves battery power of the end user’s device and requires continuous analysis of the respective network and end user’s device data.

[71] For instance, in France the ECS provider SFR owns several news TV channels and has been reportedly using an in-house developed analytics tool to detect significant audience variations. In Spain, Telefónica also uses data analytics methodologies to gather insights on media content consumption from its IPTV customers.

6.2. Impact on the competition dynamics

With such a taxonomy in mind, a question arises about whether and how access to data could affect competition in the telecommunications sector. Consumers could benefit from innovative products and services based on data collection and analysis: the development and implementation of smart home services using relevant data about consumer habits and location, for example, could improve safety, energy efficiency and comfort. The increase in the QoS that can be derived from the analysis of network management data could also benefit ECS consumers. Overall, the question of the impact of the development of the data economy on competition between ECS providers depends on how much of a competitive edge can really be derived from the use of data. If such an advantage was at some point deemed sizable compared to the other criteria relevant for consumers when they choose their ECS provider (e.g. price, quality of service classes, coverage, etc.), then the question of the structural differences, in terms of access to data between the different types of ECS providers, might need to be further elaborated upon when NRAs conduct their market analyses.

For example, ECS providers with a large number of customers could possibly benefit from economies of scale in terms of data collection and analysis. ECS providers that are vertically integrated across different levels of the value chain might also benefit from economies of scope. For example, a telecommunications company with a broad product portfolio in the areas of fixed network and mobile services, as well as IPTV and Smart Home services, could collect significantly more data about its customers' behaviour and accordingly extract value from this. Overall, the combination of data from various areas promises higher innovation or optimisation potential. Conglomerate ECS providers, which are active in other sectors, could also have a relative competitive advantage compared to their competitors that are only involved within the ECS market.

Furthermore, network operators have exclusive access to additional network data compared to resellers or light virtual network operators. Therefore, the question arises whether network operators may be able to extend the benefits from data collection and analysis. In the past years, several network operators developed partnerships with different content providers, for example offering zero-rating for music streaming services. This requires the identification of the network traffic of the specific content partner and enables network operators to offer business models based on this (e.g. bundling with content services). These business models based on data analytics are, by default, not replicable by light virtual operators unless there is a corresponding wholesale offer in which access to this data was addressed. Another area where mobile virtual operators might not have the same conditions with regard to access to data is national roaming. Network operators are able to assess the performance of their own network, whereas virtual operators depend on their network operator with regard to a non-discriminatory access to such data. This means that, when choosing a wholesale network to contract with, virtual operators may need to consider the access to specific data as an additional criterion. Furthermore, different quality of service classes are not necessarily replicable with wholesale access.

Regarding the competition between OTT and non-OTT ECS providers, it can be noted that messaging and internet telephony services are increasingly competing with traditional telecommunications services, such as SMS or voice services, as they are broadly adopted by consumers. Consumers might expect these comparable services to be governed by the

same framework regarding data protection (both for the content of the communications and metadata). Several network operators responded to the public consultation that they perceive a competitive disadvantage compared to OTT players with regard to the possibilities of data collection and analysis. In particular, there were complaints about the different treatment of location data. Contributions to the public consultation notably underlined that the GDPR (which is applicable for location data derived from satellite-based positioning systems) enables greater flexibility in location data analysis, e.g. via consumer consent, whereas the ePrivacy Directive currently in force (which is applicable for location data derived from mobile networks) allows only an anonymised analysis on aggregated location data. However, it is not clear how location data from mobile networks will be handled after the new ePrivacy Regulation comes into force.

Regarding competition among all ECS providers, it has to be taken into account that, through the rising transparency of markets and the additional methodologies of data gathering and analysis, the (tacit) coordination between competitors can be made easier and does not necessarily require secret agreements. For example, competitors could use the mobile number portability system for market monitoring with regard to customer flows[72]. If market participants use such information to coordinate, for example on prices, it could have a negative impact on customers.

The integration of telecommunications services within products and services in the context of IoT also brings up the question about when such an integrator becomes a telecommunications provider itself. In many cases, the telecommunications providers have no direct relationship with the end customer of these products. For example, when a customer buys a car that has integrated internet connectivity for entertainment or maintenance purposes, this customer often has a contractual relationship only with the car manufacturer. Some respondents to the public consultation stated that it is necessary to ensure a harmonised European approach with regard to this issue in order to avoid legal uncertainty and a fragmentation between different Member States (e.g. if one Member State defines an integrated product or service as a telecommunications service and the neighbour Member State does not).

7. RELEVANCE OF NRAs' EXPERIENCE FOR THE DATA ECONOMY

NRAs play an important role in the data economy. In carrying out their core tasks, NRAs stimulate competition to provide the infrastructure for the transportation of data by making and performing market analysis and encouraging the development of next generation networks. The NRAs' traditional core mission is therefore an essential input for the flourishing of the data economy. NRAs are also involved more broadly in interactions between ECS providers and Internet content providers, be this in the context of network

[72] http://ec.europa.eu/competition/mergers/cases/decisions/m7758_2937_3.pdf, p. 225 - 227

neutrality, interconnection issues, relationships between ECSs and non-ECS OTTs (e.g. Netflix) or bundling issues that may include Internet content providers (e.g. Spotify).

In general, the previous analysis shows that the economic forces of data, driven by the new technological capacities of data processing and the array of commercial uses, have created new markets and new models for the concentration of market power, reliant on digital ecosystems and on the constant exposure of civil society to digital data extraction and analysis (as discussed in chapter 3).[73] As a result (see chapter 4), the regulatory approach to the data economy is heterogeneous and fragmented: it ranges from pieces of regulation protecting privacy and cybersecurity to types of economic regulation intended to enhance the fair and transparent functioning of services and underlying markets. The transformative reach of these developments has also affected the providers of electronic communications networks and services, which on the one hand are key enablers of the data economy (see chapter 5) and on the other hand are developing new business models in this changing environment (see chapter 6).

In this context, this chapter explores the scope for possible involvement of NRAs and BEREC in the data economy, taking into account that NRAs have accumulated considerable experience in *ex ante* market monitoring, consumer protection and in taking preventive action to promote competition. The NRAs' traditional core mission is therefore an essential input for the flourishing of the data economy.

7.1. Complementing *ex-post* regulation

In general, the main tool of regulatory economic intervention in the data economy is the application of *ex post* competition law. In fact, several respondents to the public consultation (ECTA, ETNO, Digital Europe, Facebook, Telefonica, Oracle) considered that competition law seems to be the most suitable instrument to tackle market failures in this sector. However, other respondents to the public consultation (The Law Society of Scotland, Confidential contribution, Liberty Global, EDRi, Article 19) challenged the sufficiency of *ex post* competition law, questioning the timeliness and effectiveness of such interventions, which they considered too long when compared to the fast gains and scope of abusive conducts[74]. Besides, there is an ongoing debate[75] about the assessment of buyouts of innovators and mavericks in merger control and, more generally, how to take more account of the impact of mergers on innovation.

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[73] Three of the most recent studies and reports which have investigated this new scenario and some of its key enablers are the following: EC Report, *Competition policy for the digital era*, April 2019; Autoriteit Consument & Markt, *Market study into mobile app stores,* April 2019; UK, House of Lords, Select Committee on Communications Regulating in a digital world, https://publications.parliament.uk/pa/ld201719/ldselect/ldcomuni/299/299.pdf

[74] See "BEREC Report on the outcome of the public consultation on the data economy" BoR (19) 45. June, 2019.

[75] See for example the "Shaping competition policy in the era of digitisation" conference organised by the EC in January 2019: http://ec.europa.eu/competition/information/digitisation_2018/conference_en.html

The report recently released by DG COMP on “Competition policy for the digital era” states that “competition law enforcement might be overburdened to deal with implementation and oversight of interoperability mandates imposed on dominant players” [in the digital economy].

BEREC considers that the application of competition law is still a key instrument of regulatory economic intervention. However, as highlighted by several respondents to the public consultation, the timeliness and effectiveness of regulatory measures in connection with potential competition issues pertaining to the data economy are fundamental. Also, given the tendency of data-driven markets to be subject to winner-takes-all effects (“market tipping”), which can challenge the effectiveness of *ex post* remedies, BEREC considers that it would be worth assessing the question of whether *ex post* control should be supplemented by *ex ante* monitoring and possible control measures.

BEREC also has some experience, based on the technical capabilities needed to monitor ECS markets, which could be useful in data economy-related issues, as shown in the next sections.

7.2. Opportunity for collaboration among regulatory bodies

Setting up institutional collaboration among regulatory bodies and cooperation with other relevant authorities in order to coordinate efforts, share information and ensure a more joined-up approach to the data economy, would be highly beneficial for the whole data economy environment. Most of the respondents highlighted that closer coordination is crucial in the convergent environment of the data economy. Some respondents considered that NRAs should establish collaboration mechanisms with DPAs (EDRi, ETNO) and with both DPAs and NCAs (Article 19, BEUC, GSMA, Liberty Global, Microsoft, confidential response, Telefonica).

Mechanisms for sharing experience, expertise and information would firstly allow regulatory bodies to apply a coherent and holistic approach to data economy concerns. Secondly, coordination is also required in order to minimise overlaps in the intervention of regulatory bodies. Some respondents (Google, Facebook, GSMA, Digital Europe) stressed the importance of avoiding institutional overlap.

Overall, it seems clear that further collaboration would be beneficial to meet stakeholders’ varied needs. Competent authorities must adapt to the context of the data economy in a joint effort to consistently protect consumers, businesses and citizens without stifling innovation. Such cooperation could make the regulatory framework more consistent, inform policy-making on the need to calibrate regulatory powers, and ultimately promote a more reactive approach for markets.

Increased institutional cooperation among regulatory bodies in the data economy must not been understood as a claim for more regulatory powers or for a greater regulatory burden in itself. Rather, it would be a first step to remedy the issues that have been identified concerning timeliness and effectiveness.

Some recent reports have taken on board the challenge of addressing the potential shortcomings of regulatory action. These analyses propose the creation of a new regulator, which is either able to consider competition policy alongside other forms of regulation, or which has the powers to identify and reduce the scope for underenforcement. One example

of this could be the proposed Digital Authority in the UK[76]. Other proposals include the potential merging or consolidating of the competences of regulatory bodies, which currently have different remits of action, under one umbrella organisation, which would guarantee the consistent application of rules across the entire digital ecosystem, even if these rules are inspired by a different rationale and scope.[77]

7.3. NRAs' toolkit applied to the data economy

NRAs' experience in the context of ECS markets may be of relevance if competition law is overburdened with implementing and monitoring remedies for certain market failures in the data economy. Data economy markets across the EU typically exhibit a high degree of heterogeneity and dynamism, which could call for **continuous market monitoring**.

Such tools are paramount in the timely identification of market developments and anticipation of possible competition issues, a context which is comparable to that of the data economy. The process for applying these tools involves: (i) planning the approach to data collection; (ii) identifying data requirements and data segmentation, taking into consideration market specificities; (iii) designing collection methods, deciding on the regularity of collections; (iv) engaging with market operators and other institutions to gather information; and (v) critically validating the gathered data. In the case of the data economy, such an approach could help to quickly identify market failures before any stakeholder files a formal complaint.

In addition, such experience is critical in establishing a fair balance between the informational burden imposed on firms and the need to monitor the market effectively. This balance is of particular importance in circumstances where, due to the dynamics and speed at which companies and business models evolve, timely decisions are crucial to avoid reaching 'tipping points', after which reestablishing effective competition would be very difficult. It should be noted that competition authorities can usually initiate an enquiry on their own initiative; however such work is not usually conducted on a regular, continuous basis.

In order to carry out the abovementioned tasks in an effective way, BEREC underlines that regulatory bodies need to be equipped with appropriate tools to request the necessary data from relevant undertakings in the data economy.

The report on "Competition policy for the digital era"[78] stresses the potential need for data interoperability in the data economy. One situation in which this is particularly relevant is when a dominant firm is required to grant access to continuous data. The principle of proportionality requires that there must be a legitimate reason for such an access obligation, the access obligation must be suitable to address the market failure and there cannot be any

[76] House of Lords, cit., p. 62 ff. The Digital Authority should liaise with EU and international bodies responsible for digital regulation.
[77] This position was expressed by one confidential respondent. The idea (for the UK) has also been advocated in Doteveryone, "Regulating for Responsible Technology". Doteveryone. October, 2018 https://doteveryone.org.uk/wp-content/uploads/2018/10/Doteveryone-Regulating-for-Responsible-Tech-Report.pdf
[78] Ibid footnote 3

less onerous way of addressing it. NRAs have a proven track record in building up sufficient technical, legal and economic knowledge on how to balance efficiency gains, incentives for innovation and consumer welfare, which would be relevant in such cases.

Additionally, NRAs also have technical knowledge on issues such as portability, which, at least in some aspects, could be deemed relevant to achieving lower switching costs for end-users wishing to move from one ecosystem to another[79]. Several respondents to the public consultation acknowledged the importance of data portability and several stakeholders underlined the initiatives they undertook themselves to enhance the portability of their users' data. While GDPR already introduces a right to data portability, the recent report "Competition policy for the digital era"[80] highlights that "*data portability in the GDPR may (…) facilitate a data subject's switching between services, but it has not been drafted to facilitate multi-homing or the offering of complementary services, which frequently relies on continuous and potentially real-time data access".* NRAs could build on the expertise gained in developing policies on the portability of phone numbers to stimulate actors to define common data formats.

NRAs can also be involved in the fostering of **interoperability**. As mentioned by some respondents to the public consultation, interoperability can help to maximise network effects, to the benefit of the end-users, while weakening winner-takes-all effects[81]. However, it can lower innovation incentives, as a requirement for interoperability could undermine current business models of respective ecosystem providers. It could also represent a technical burden for stakeholders and raise privacy questions. As such, the experience of NRAs could be of help to carefully design such standards, should such an intervention be deemed appropriate.

NRAs' work also encompasses **fostering the development of wholesale markets**, notably evaluating the effect of practices such as long-term access agreements or sharing mechanisms. Such evaluation might be relevant in the case of access to data via data-sharing mechanisms. It should be noted that the European Commission (in its communication in April 2018[82]) proposed a series of approaches on data sharing – namely, an open data approach, a data market approach, and data exchanged through a closed platform. Several contributors to the public consultation underlined occurrences of such data-sharing mechanisms that have already been successfully implemented by the market. Other respondents warned about the security and privacy risks that data-sharing mechanisms can cause and therefore urged close cooperation with DPAs if such mechanisms were to be encouraged by public authorities.

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[79] As noted by (Kerber and Schweitzer, 2017), *Interoperability in the Digital Economy, 8 (2017)* – NRAs experience on mandated access or interconnection "*is arguably the best example* [of areas where] *the EU has gone far beyond a voluntary pro-collective-standard-setting approach and has created a legal basis for mandating interoperability within the framework of a regulatory regime*".

[80] http://ec.europa.eu/competition/publications/reports/kd0419345enn.pdf

[81] The European Parliament (2015) recognizes the same benefits of interoperability as an option for policy makers to potentially mitigate competition problems.

[82] See : http://europa.eu/rapid/press-release_MEMO-18-3365_en.htm

Finally, NRAs have acquired considerable experience regarding fostering **transparency and non-discrimination obligations**, concerning either just the dominant players or all players in a market. This can be particularly relevant, if the market structurally allows discriminatory practices that are detrimental to consumers that competition law cannot efficiently address. The issue of unfair contractual terms imposed by dominant players was notably raised by several respondents to the public consultation.

In brief, NRAs have considerable experience in monitoring markets and market conduct (also related to net neutrality), as well as implementing remedies, such as interoperability, number portability and access obligations. In fact, the tools (e.g. market definition and analysis under a prospective point of view, imposition of remedies), the required technical capabilities and economic concepts (network externalities, lock-in effects, economies of scale and scope, etc.) guiding the work of NRAs in the current ECS framework would similarly apply in the context of the data economy if market failures appear in the data economy that are not adequately addressed by competition law. In such a situation, NRAs' experience might be worth being shared to build on this knowledge.

8. THE USE OF DATA IN NRAs' ACTIVITIES

Finally, besides the general question of how NRAs' activities could take the data economy into account, which was touched upon in the previous sections, it should also be noted that the new capacity in data collection and analytics is also enhancing the way in which NRAs perform their regulatory functions.

8.1. NRAs and open policies

NRAs, like other public bodies, participate actively in the development of a market for services based on the re-use of public sector information (PSI). The re-use of government-held data is regulated by Directive 2003/98/EC (already modified by Directive 2013/37/EU), which is under revision (see section 4 for more details).

For their part, NRAs have already started to make datasets with relevant sectoral information publicly available online. For instance, ARCEP, BNetzA, CNMC, CTU, OFCOM, RRT and RTR have developed and organised datasets with sectoral information in their open data portals[83].

[83] See CTU http://data.ctu.cz. CTU's portal contains more the 100 datasets. It is connected to the National open data portal https://nkod.opendata.cz/datové-sady since 2016 and through this portal also to the European Union open data portal. The English version is ongoing.
For Arcep, see https://www.arcep.fr/en/maps-data/open-data.html.
For Ofcom, see https://www.ofcom.org.uk/research-and-data/data/opendata.
For CNMC, see http://data.cnmc.es
For RTR, see https://www.rtr.at/de/inf/odUebersicht.
For RRT, see https://www.rrt.lt/ (also available in English), where links on open data are available including open data (reports) on electronic communications.

8.2. NRAs and data analytics

The digitisation of the economy in recent years is linked to an enormous increase in the quantity and quality of available data and the development of tools and methods of data analysis. These may also be used by NRAs to improve their regulatory performance in many areas: consumer protection and empowerment, market monitoring, market analysis and the production of statistics. Some applications can already be identified[84]. For example, data visualisation tools offer a new approach to customer protection and empowerment, as data are not only easier to understand and quicker to access, but are also more suitable for effectively supporting customers in their decision-making. For instance, mapping network coverage, with constantly updated and accessible geographic details, enables end-users to identify the availability of connectivity in residential areas. For instance, some NRAs run smart broadband maps endowed with the tools to measure the quality of service offered (AGCOM,[85] ARCEP[86], BIPT[87], BNetzA[88], CTU[89], RRT[90] and OFCOM[91]).
New tools, developed following an open data approach, can be used to engage consumers in surveys about their experience regarding products and services[92]. This information can be useful to identify specific market issues (e.g. market bottlenecks and consumer harm), as

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For BNetzA, see https://www.smard.de/en/5790

[84] The challenges related to data usage, data generation, collection, validation and analysis, should also be taken into account however. When collecting and using data, NRAs must be alert to potential biases and risks which may significantly impact the quality of data (e.g., data tampering by the sources, non-representative samples, uncleansed data, etc.).

[85] See https://maps.agcom.it/

[86] Arcep has developed accessible online coverage tools, which enable users to make more informed choices when selecting their fixed or mobile operator: the (i) mobile market tool (see https://www.monreseaumobile.fr/) provides both coverage and QoS measurements, while the (ii) fixed market tool (see https://cartefibre.arcep.fr) maps the coverage level of municipalities in FttH networks.

[87] See https://www.bipt-data.be/en/projects/crowdsourcing

[88] See https://breitbandmessung.de, which is a tool to test the quality of the internet connection and also shows heatmaps of the measurements.

[89] See https://qos.ctu.cz/ where mobile broadband coverage maps, including mobile QoS measurements, are available.

[90] See http://matavimai.rrt.lt/, where consumers can find measurements of wireless (mobile) broadband internet quality.

[91] Ofcom's mobile broadband and mobile checker enable users to check the availability of different broadband and mobile services for a postcode area and also to carry out speed tests. See https://checker.ofcom.org.uk/

[92] Tools such as RTR's *NetTest* (see: https://www.netztest.at/en/) and ANACOM's *NET.mede* (see: https://netmede.pt/) and CTU´s *NetMetr* (see: https://www.netmetr.cz/en/) allow users to test the quality of their internet connection (including upload, download, ping, signal strength) and compare results with the existing data pool by operating system/browser, operator, type of connection and location. RRT's tool, matuok.lt (see http://matuok.lt/) also allows users to test the quality of their internet connection (including upload, download, ping and information on average speeds of all ever performed measurements on matuok.lt). This bidirectional exchange of information allows NRAs to empower end-users while collecting large amounts of data on service usage and quality (with different levels of segmentation), which are valuable for the production of statistics, market monitoring and market analysis. ARCEP also developed an early warning tool (https://jalerte.arcep.fr/) to crowd-source consumers' complaints and help the Authority detect emerging patterns revealing systemic issues in the telecoms sector.

well as to improve statistical analysis (collection, compilation, correlation). This new ability of quickly finding, selectively correlating and engaging with new data sources (e.g. 'new' groups of consumers) is a major result of digitisation and its paradigm-shifting effects, contrasting with traditional methods of data collection and analysis.

Employing powerful and specialised analytical tools in processing and refining large datasets can become less time-consuming and more efficient, particularly when combined with the necessary human expertise to make data useful.[93] Insights are more accurate, evidence-based, timely and relevant. Processes are simplified and time can be saved, so that insights can be put into action and promptly support robust regulatory decisions on time-sensitive issues.

Additionally, these instruments can be used to support post-evaluation analysis of policies and measures that have been implemented (e.g. obligations resulting from market analysis)[94]. Assessments of this nature do not only provide regulatory transparency, but also act as a test to corroborate previous analyses and reflect on possible improvements, adding to the benefits of using data in NRAs' work.

8.3. Future challenges

NRAs are implementing the first steps to make the most of the new capacities offered by data collection and analytical tools. This requires them to engage in developing a consistent and effective roadmap. Indeed, future challenges will be demanding and will require effort to achieve improvements and consistency, for both open policies[95] and data analytics[96]. Under this new paradigm, regulation processes can produce more timely, empirically-based and transparent decisions. Such gains, however, will require an appreciable investment of resources in the medium and long term.

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[93] These tools are characterised by being capable of a wide range of analytical methodologies, from descriptive and predictive statistics to cognitive modelling and simulation in more mature applications.

[94] The application of econometric models in estimating the effects of policy-making or regulatory decisions is illustrative. BEREC has made use of such methodologies in its Report on Post-Merger Market Developments - Price Effects of Mobile Mergers in Austria, Ireland and Germany. (see: https://berec.europa.eu/eng/document_register/subject_matter/berec/download/0/8168-berec-report-on-post-merger-market-devel_0.pdf).

[95] With regard to the further development of open data processes, several steps are required: to develop a user-friendly Open Data Portal; to integrate NRA portals into the network of national and EU Open Data Portals; to adopt user-friendly formats that are readable with the most common analytical tools; to elaborate common guidelines for consistency and effective case processing; to develop application programming interfaces for the provision of real-time access to dynamic data.

[96] Implementation processes requires significant initial efforts. These relate mainly to the need for governance revision and transformation; ensuring the availability of hardware and software capable of dealing with the specificities of data used by NRAs; providing specialized training to human resources (or engage in external recruiting); performing data cleaning and normalisation procedures.

9. FUTURE WORK

There are several potential areas for BEREC's future work in the context of the data economy.

NRAs will work in close cooperation to share experiences on the application of data collection and analytical tools in order to improve regulatory activities. This is a long-term effort, for which BEREC is an adequate forum for sharing successful experiences. This could be especially interesting on such topics as the joint post-evaluation of regulatory policies, the use of geographical data, tariff analysis, or with regard to the availability of data for consumers and stakeholders.

BEREC also notes that the impact of data availability and data processing could be worth being taken into account by NRAs when assessing market power in the ECS markets and when defining potential remedies. This may be revisited in the future, depending on the evolution of ECS markets.

Another area for future work is conditional on the finding of market failures in the data economy markets that cannot be efficiently addressed by the application of competition law. In such a situation, NRAs' experience from monitoring and regulation of ECS markets could be used to help the relevant authority in charge of dealing with such issues to design a framework adapted to the specificities of the data economy, notably to define procedures, objectives and tools that could be applied. In general, collaboration with other institutions would appear to be indispensable for designing potential regulatory tools in the field of the data economy regarding issues such as market power assessments, transparency, reference offers, etc.

BEREC can be a potential partner to help design new approaches to *ex ante* regulation related to the data economy.

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ANNEX 1 - SUMMARY OF RELEVANT WORK CONDUCTED BY NRAS

1. AGCOM

On 30 May 2017, the Italian Competition Authority, Communications Authority (AGCOM) and Data Protection Authority opened a joint sector inquiry on the so-called "*Big Data*", aimed at identifying potential competition concerns and defining a regulatory framework able to foster competition in the markets of the digital economy, to promote pluralism within the digital ecosystem and to protect privacy and consumers[97]. Based on the idea that the rise of big data is at very crux of the data-driven economy, the Italian authorities aimed to determine whether, and under which circumstances, access to, collection and use of big data might affect interested markets, including electronic communications.

This joint initiative shares the EU Commission idea that privacy concerns are legitimate ones, but public authorities should not use those concerns as a reason to restrict the free flow of data in an unjustified way. More specifically, the advent of online platforms and big data in the digital economy require, according to AGCOM, a **holistic** approach to gain a better understanding of what constitutes an entry barrier, harms the right to data protection and facilitates anticompetitive practices in order to design appropriate *ex ante* rules and *ex post* intervention.

Overview of AGCOM Interim report in the context of the joint inquiry on "Big data" launched by the AGCOM deliberation No. 217/17/CONS

In the context of the aforementioned joint inquiry, AGCOM conducted a research study in cooperation with the University of Rome 'La Sapienza' and the University of Venice 'Ca' Foscari'.

Based on the idea that the very methods of economic analysis should be based on big data analytics, the study presents an analysis of the Google Play apps permissions and features regulating the personal data exchange from consumers to app developers and online platforms. The dataset includes information on 1,135,700 Google Play apps, i.e. about 80% of the total number of apps available on the store. Such information was collected based on a process called "crawling". The remaining 20% is part of a residual share of applications, belonging to the "long tail", that were not frequently downloaded by users.

The study is a crucial step, at least an intermediate one, through which AGCOM highlights the main problems and opportunities arising from the use of big data, with particular reference to the markets (those of communications) and to subjects (media and political pluralism, consumer protection) of strictly within the institutional competence of AGCOM. The main aim of this interim report is to provide empirical evidence and theoretical background for the future work of the ongoing joint investigation, representing indeed a

[97] A reference document (in Italian) is the AGCOM Board deliberation No. 217/17/CONS. Please see: https://www.agcom.it/documents/10179/10875949/Allegato+4-9-2018/f9befcb1-4706-4daa-ad38-c0d767add5fd?version=1.0

"guide" simultaneously offering tools, mainly economic concepts, and ideas for the identification and analysis of further aspects in the subsequent phases of the investigation in view of the problems observed.

More detailed explanation of the report/initiative

The *AGCOM "Big Data" Interim Report* is the outcome of a research study conducted by the AGCOM Department of Statistics and Economics in cooperation with two research partners: University of Rome 'La Sapienza' - Department of Computer, Control, and Management Engineering; University of Venice 'Ca' Foscari' - Laboratory of Data Science and Complexity. Being part of the work of the aforementioned Joint Sector-Inquiry on Big Data, the report was also circulated and subject to comments by the AGCOM institutional partners in this initiative: the Italian Privacy Authority and the Italian Competition Authority.

The basic assumption of the study is that big data represent the key productive factor in the data-driven economy, which makes the offer of all products and services (including non-digital ones) increasingly responding to the needs of consumers and citizens. This tendency appears being incontrovertible and strengthened by the fact that, for the vast majority of individuals, a significant part of private life, as well as that of work life, "moved" to the network thus becoming one of the main sources of data. Despite big data present manifold potentialities, many of which are still unexplored, the Interim Report underlines the presence of some associated risks.

First, the big data ecosystem is characterized by the presence of several forms of incomplete contracting, by implicit markets (i.e. in which the bargaining of the asset takes place in a spurious manner), as well as by notional areas (i.e. characterized by perfect vertical integration and by merely potential market demand). All these risks are the source of deep market failures affecting social, static and dynamic efficiency of the whole system.

Secondly, there are collective risks, linked, *inter alia*, to the lack of incorporation of positive and negative externalities in the market.

In order to provide all stakeholders with an analytical contribution, the report is structured in three parts. The first (Chapter 1) highlights how the main characteristics of big data determine their complexity and, in turn, make it difficult to delimit precisely the perimeters of single markets whose borders are often overlapping, and where many companies are vertically or diagonally integrated. The presence of network, scale, variety and time economies, as well as the effects deriving from network externalities, engender concentrated market structures. Chapter 2 puts the individuals (consumers, citizens) at the centre of the big data ecosystem and questions the traditional, and now obsolete, distinction between personal and non-personal data. In brief, much of the information gathered related to a person, even when it does not constitute «personal data», could turn into so much as sensitive data by using technologically advanced big data analytics methods.

Individuals are also at the centre of the quantitative and data-oriented analysis proposed at the end of Chapter 2. Being a source of digital data, consumers are in fact at the crux of the relationship between the increasingly massive use of mobile device applications and the release of information obtained from a rich dataset of APPs and the relative permissions required.

From the empirical study, AGCOM has derived a number of theoretical implications. In the context of a commercial relationship that does not appear to be structurally well

contextualised and codified, i.e. struggling to have a well-defined contractual structure, the market fails due to the presence of huge information asymmetries between consumers and online service operators. Incompleteness of contracts disciplining property rights over data, absence of explicit markets regulating price formation, as well as informational asymmetries, compromise the possibility that the system converges towards a static and dynamic, socially efficient balance.

Chapter 3 analyses the effects of these issues related to big data on the information system, and therefore on modern processes shaping public opinion. The ultimate purpose of the Report is, therefore, to redesign the reading of data-driven economy and society, explaining opportunities and risks of the current context, to favour both a sustained growth of the economic context and a social, efficient and deeply democratic progress.

Big data represent the key productive factor in a data-driven economy. There are several areas, both private and public, where the use of analysis techniques of big data has allowed to create new services, improve existing ones, innovate production and distribution processes, make the offer of all products and services (even non-digital) responding to the needs of consumers and citizens. Among them, development of IoT and M2M, cloud computing and investments in data centres and network capacity deserve specific attention by NRAs. In addition, the rise of big data platforms, especially social networks and search engines play an increasingly crucial role in the EU digital single market.

In fact, in the **big data ecosystem,** market failures are related to the existence of barriers to entry and to develop, which can be found at all stages of the Internet value chain. One of the main segments that will rapidly evolve is the one related to data centres. As the size of the data collected grows, the need to invest in data acquisition, storage and analysis technologies increases. In this context, the world market is converging towards concentrated assets where the positions of online platforms such as Amazon and Google stand out.

From the consumer perspective, the phenomenon of big data made the traditional distinction between “personal data” and “non-personal data” completely obsolete since it is extremely difficult to establish *ex ante* among all the information gathered about an individual, whether they constitute personal data, or not. Downloading apps is one of the main data provision mechanism, as well as apps usage by consumers.

In this context, the information asymmetry between users and operators is pervasive and structural: consumers do not have all the information they need to make an informed choice, but many of the behaviours, to be efficient, would require a degree of technical knowledge that goes far beyond the skills widespread among the population. A higher degree of transparency is often useless where consumers fail, due to a structural gap in technological knowledge, to understand this information. Furthermore, choices such as those relating to the transfer of personal data are carried out very frequently impulsively and without an evaluation of the real consequences of the implicit exchange.

The data exchange often provokes **structural market failures**. On one side, because the investments made by companies to collect data on individualsare likely to lead to an over-investment in gathering information. On the other, in the presence of transaction costs and uncertainty regarding the assignment of property rights to data, probably market forces are not able to guarantee the achievement of an efficient situation. The possibility that the interests of those who hold wider technical knowledge and information about the data will prevail, materializes.

The APP stores are an important example of methods through which digital data are exchanged. In this report, AGCOM has analysed a dataset with over a million applications. It emerged how free apps require a significantly higher number of individual data compared to paid apps. There is, in essence, an implicit exchange of data between users and operators, which is part of the commercial relationship concerning the APP. The absence of a real market mechanism can only make these relationships incomplete and inefficient. The consumer does not have a clear perception of which data are transferred, of their real value (price) and how they are treated, both for primary and, even more so, secondary uses. It is about a one-off transaction concerning other goods (the APPS), against the dynamic use of users data. It is, therefore, the same structural configuration of the market and of the related transactions to be distorted and, consequently, to lead to incomplete markets, which inevitably produce inefficient and unbalanced results. The trend of downloads, moreover, detects a “long tail” phenomenon. This determines that only a few APPS, 2%, are installed by a considerable number of users. Only 6 APPS are installed more than 1 billion times: Facebook, Google Gmail, YouTube, Google Maps, Google Search and Google Play Services. With a very large number of applications and operators, the market is concentrated in a few large platforms.

The use of big data from search engines and social networks is an aspect of particular importance due to the increasingly important role played by these platforms in the information system, at international and national level. On the one hand, their capacity of gathering personal information and extracting value from data by means of accurate profiling, *inter alia*, makes these actors the world leaders in the online advertising sector - a resource that is still the main source of funding for online information -. On the other hand, they now represent the main distribution channel for online news, provided that they operate as gatekeepers for access and distribution of online contents.

The spread of big data is structurally changing the global Internet ecosystem. Among online platforms, social networks - due to the time spent by users within, the multiple actions that individuals perform and the reactions they express through their profiles / pages /accounts, as well as the social relationships they establish - are certainly among the entities able to acquire the greatest variety and the largest volume of data on individuals. The data gathered include very sensitive information such as those related to ideological and political preferences and information content read, viewed, appreciated, commented and shared.

Social networks have definitely become an integral part of the daily informative diet of citizens in Italy and around the world.

The technology shift related to the advent of big data, and of data-driven economy, needs a change of paradigm also at the policy-approach level. First, big data make it necessary to overcome the traditional distinction between different types of data (personal, sensitive, etc.). The new approach must refer simply to the data “*per se*”.

In addition to the undisputed economic and social benefits deriving from the advent of the data-driven economy, some risk factors exist. The existence of causes of market failure (such as incomplete contracting, implicit markets, information asymmetries, market power positions) has been accounted for. Furthermore, new possible discriminatory practices emerge, among which those linked to the price are the most widespread. The price discrimination, which with the modern online profiling techniques becomes “perfect”, involves a sure effect of social redistribution prerogative of online operators and, in a system on

several sides, to the detriment of specific categories of users (which from time to time may be consumers, workers, publishers, etc.). These practices, even when theoretically efficient, present very significant social risks. For example, discrimination, often on an algorithmic basis, risks extending, even involuntarily, to differences in the population based on ethnicity, race, sexual orientation, and health condition.

The market failures have repercussions on the whole social context, including the information system, the pluralism of sources, and the same methods of social aggregation and of public opinion creation. As a consequence of the existence of structural and lasting market failures, it is necessary, especially where social and political rights are under discussion, to adopt an *ex ante* approach to the data regulation (and to possible regulation of related algorithms).

Moreover, this new paradigm must take into account that the information asymmetries between users and operators are pervasive and structural. In this context, it is difficult to restore conditions of efficiency through mechanisms of transparency and informed consent. In fact, these regulatory tools appear, in many cases, insufficient to guarantee a cognitive rebalancing between operators and consumers, in a situation in which actors such as experts in the sector, specialized institutions and research centres often do not have at their disposal sufficient knowledge to understand the entity and the very nature of the phenomena. In line with what is already happening in high-tech contexts (such as those of electronic communications), it appears necessary to accompany the new regulation towards technical forms of direct regulation of operators using big data.

Preliminarily, the new paradigm needs to open the black box regulating the processes taking place within the big data ecosystem, such as, among others, moments and methods of data acquisition (data gathering & storage), functioning of the algorithms (algorithm accountability), methods of conservation and analysis (data analytics), derived information, and deriving (primary and secondary) uses. With respect to these and other aspects, further work will be needed.

The new approach must therefore be based on facts, information and knowledge. In this sense, AGCOM has already started research cooperation with the most prestigious national and international universities (in the case of this Report, the Department of Computer Engineering of “La Sapienza” University of Rome) and carried out analysis with experts in the field (in the case of online disinformation, with Prof. Walter Quattrociocchi).

In conclusion, the report illustrates a recommended policy approach by indicating the AGCOM *Technical Roundtable to fight against online disinformation* as a good practice in the paradigm shift: open the black box with analysis and surveys based also on information requested to online platforms, analyse newsfeed and recommendation algorithms, identify and bring out collective and shared solutions to the focused market problems, define *ex ante* rules within the operators.

2. UKE

Based on national law, the Polish NRA (UKE) annually collects data which map the telecom infrastructure in Poland. This system is called the Information Broadband Infrastructure System (SIIS). It is an IT system and a huge database with millions of records for gathering information about telecommunications infrastructure, public telecommunications networks and buildings, with the aim to enable co-location. The database contains data collected once a year - until the 31st of March, from all telecommunication companies, local government entities and public utility enterprises (approx. 3,500 entities submitting and 9,400 obliged in total).

The following elements fall within the scope of inventory:

- backbone and distribution telecommunications networks;
- telecommunications hubs;
- transmission systems;
- points of interconnection between the public telecommunications networks;
- collocation buildings;
- other existing telecommunications infrastructure;
- buildings within network coverage;
- services (but, according to telecommunication law, the information about the services provided is classified).

All collected data give a complex picture of the Polish telecoms network. Topology of telecoms nodes connected by fibre optic and copper cables, relation of various types of infrastructure to one another and radio lines with access network, divided with respect to technology, as well as with respect to which broadband services are provided over these resources.

The system uses various external state databases in the mapping process.

The first one is TERYT - the National Official Register of the Territorial Division of the Country. This database is managed by the Central Statistical Office. It provides information about unique identifiers for cities, streets etc.

The second important resource is PRG – Polish National Register of Boundaries. This database is managed by the General Office of Geodesy and Cartography. With its help, there is information about addresses and the geographical coordinates of all of the buildings, which are used to geocode data.

The next one is an Address System for Streets, Properties, Buildings and Flats (NOBC), which is a part of TERYT system. This database is also managed by the Central Statistical Office. It provides, among others, information about the categories of buildings, like multi-family building, family building, business building etc. Thanks to it, the system provides broad information, like: address, economic category (e.g. residential, business), availability of telecommunications infrastructure and services, location of providing services. Data from the system is supplemented by data from commercial databases – e.g. population, demographics, wealth, resulting in detailed information about the building, such as address, location, availability of telecommunications infrastructures, provided telecommunication services and demographics.

The system enables many possibilities to make various analyses (including *ex ante* market assessment) performed at different levels of detail like street, city, NTS-3 level, municipality, etc. It also gives possibilities to identify areas for future investments. With the information about the age structure, wealth, the demand for telecommunication services, it can also provide information on where investments are unprofitable and how much subsidy they should get.

Collected data is used to prepare and publish annually the "Report on state of the telecommunications market in Poland", including infrastructure coverage. Data is also publicly available under Information Point for Telecommunications (PIT), related with Cost Reduction Directive[98]. PIT helps investors and telecommunications companies to plan their investments by providing information about currently existing infrastructure, applying procedures and law.

Data from the system SIIS is subject to standardization and combining with the available databases, usually with the use of Oracle. The data is also subject to a process of geocoding - in GIS tools. Collection process incorporates several build-in data cleaning rules, but data is also monitored and tested for consistency in many processing stages.

The database tools and technology used are:

- Oracle;
- FME – a collection of tools for data transformation and data translation;
- QGIS - cross-platform free and open-source desktop geographic information system (GIS) application that provides data viewing, editing and analysis capabilities;
- ArcGIS - used for: creating and using maps, compiling geographic data and analysing mapped information;
- Python (Lxml, Celery, Django);
- Javascript (jQuery, jQuery UI).

[98] Directive 2014/61/EU of the European Parliament and the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks.

3. BNETZA

Background of "Data as a factor of competition and value added growth in the network sectors"[99] analysis

The economy and society are undergoing a rapid change as a result of the digital transformation. Technologies such as the Internet of Things are spreading to more and more fields and enabling the smart networking of machines and resources. Networked functions are added to household goods, modes of transport, buildings and means of production and enhancing their range of functions. This is enabling the development of innovative products and services such as smart home applications, interconnected mobility services, and streaming and communication services.

At the heart of these developments lie the diverse possibilities to be found in data collection, storage, evaluation and transmission. These are the basic requirements for achieving potential intra-company efficiencies and developing innovative business models. Data is thus becoming a central factor of competition and value added growth and is of ever-increasing economic relevance. The European Commission estimates the added value of the EU data economy in 2015 at around €272bn, and forecasts an increase to €643bn by 2020.

Access to relevant data as well as the capability to analyse data will become key competition factors in the further course of digital structural changes. In the public debate about the role of internationally active digital companies, for instance, there is talk of the "data power" of these companies. This is linked to the assumption that privileged access to or exclusive possession of certain data may give rise to market power. An in-depth analysis needs to encompass the detailed legal framework as well as the economic particularities of data.

Data-based value-added processes are also growing in importance in the network sectors regulated by the Bundesnetzagentur, since data is increasingly forming the basis for the control of complex network structures and the associated processes. Physical network infrastructures are therefore also becoming increasingly smart.

Digital technologies enable, for example, continual status reports and monitoring of network components, comprehensive measurements of network activities and transactions, and dedicated control of individual processes. Customers benefit from this development, with improved or completely new products and services.

Another phenomenon is that in particular new market players are offering innovative and often platform-based business models with data as their key value-adding factor. These new business models are able to exert a significant influence on the relevant market structures.

Against the background of these developments, the paper looks at the sectors regulated by the Bundesnetzagentur – telecommunications, post, energy and railway – and analyses the expected competitive effects and the value-adding potential of data as a factor of production. Furthermore, it investigates the extent to which a need for sector-specific action is already

[99] The full version of the report is available only in German, following the link: https://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Allgemeines/Bundesnetzagentur/Publikationen/Berichte/2018/Digitalisierung.pdf?__blob=publicationFile&v=4

apparent and, in light of this, it identifies the possible options for general regulatory action relating to data as a factor of competition and value added growth.

Significance of data as a factor of competition and value added growth in the network sectors and for the digital network economy

Similar developments and comparable challenges in relation to the increasing significance of data as a competition and value-adding factor can be seen **across all the sectors**:

• Market transparency in the regulated network sectors can be increased by consolidating and publishing data, accessibility to relevant information can thus be made considerably simpler for market players (e.g. via intermediation and comparison platforms). This helps to reduce search costs and strengthen price and quality competition.

• Data cooperation can be a suitable means to exploit value-adding potential, through exchanging or sharing specific data. To avoid obstacles to competition, greater attention should be paid to ensuring that cooperation arrangements are non-discriminatory and preferably interoperable.

• Standardisation and interoperability are increasing in importance as the digital transformation progresses. Open standards and interoperable systems can contribute to improving the options for data exchange, avoiding undesirable "lock-in" effects, and lowering barriers to market entry.

• Internet-based platforms and networks also have an ever-increasing influence on established business models in the regulated network sectors. The particularities of the digital network economy (strong network effects, asymmetrical price structures, great importance of data, free products, multi-sided markets) make a competition and welfare analysis considerably more complex than for traditional markets.

The different market structures and individual regulatory frameworks also give rise to the following **sector specific findings**:

Telecommunications sector

• The growing importance of data in the telecommunications sector is reflected in the increasing range of new, data-based products and services (e. g. Internet of Things, zero-rating).

• At present, restrictions on competition relating to exclusive data availability at infrastructural level do not seem to be particularly pronounced, owing to the particularities of the telecommunications sector (including, for example, infrastructure competition, a high degree of standardisation, the options for parallel data collection via terminal equipment, and the sector-specific legal framework). In the past, there have been individual cases where the Bundesnetzagentur has imposed obligations on wholesale providers, requiring them to provide necessary information such as line characteristics to competitors on a non-discriminatory basis.

• User data and the possibilities for evaluation offer great economic potential (this applies to both wholesale and retail customers). This is shown by the fact that telecommunications network operators and service providers are extending their activities into the smart home,

health and mobility segments, for example. The aim of the telecommunications companies is to generate higher revenues by collecting and evaluating data. They are also carrying out more intensive evaluations of their own data. For instance, anonymised and aggregated location data from mobile network customers is being used to optimize traffic flows or for geomarketing, thus also enabling new business models and cooperation with other sectors.

• From the consumer's point of view, it is crucial that the same protective provisions (for instance for data protection) generally apply to comparable services (e.g. messaging and VoIP on the one hand, and SMS and telephony on the other); this is also one of the aims within the context of revising the European regulatory framework (European Electronic Communications Code).

Postal sector

• The spread of digital technology is leading to an increase in the importance of data at all levels of the value chain in the postal sector. This concerns, for instance, communicating with customers, providing postal services, and integrating physical goods flows and associated parcel-related information flows.

• From a competition economics perspective, the availability of data can contribute to strengthening the market position of individual players, for example in view of the increasing emergence of platform-based providers in the postal sector and in post-related economic sectors (e. g. e-commerce and transport and freight exchange platforms). By contrast, competition-related problems as a result of exclusive data availability do not seem to be particularly marked, owing to the specific market structures in the postal sector. The potential for distortion of competition lies primarily in those market areas that are characterised by vertically integrated company structures.

• Standardisation measures can make a significant contribution to increasing market transparency and reducing barriers to market entry, both in national and in cross-border postal markets. Nationwide implementation of open standards can improve the options for data exchange, create interoperability between the various market players, and strengthen competition. Standardisation can, in particular, contribute to integrating procedures and creating uniform interfaces, and in turn help to increase process efficiency, shorten delivery processes and times, and improve service promises, for instance for last-mile delivery or for cooperation within city logistic concepts.

Energy sector

• In the grid-based energy sector, an increasing amount of data is being collected in the area of network operations. At the same time, data-based innovations and business models are growing in importance and new opportunities and fields of applications are emerging, for example for grid flexibility. From a competition perspective there is a need for stricter unbundling requirements for integrated network operators in order to be able to leverage the associated data-based potentials.

• An entitlement for market players against network operators to publish specific network data generated by the operators could facilitate the development of innovative applications, business models and grid-beneficial services in the electricity market. It would have to be

ensured that each market participant had non-discriminatory access to a standardised set of data and that publication did not lead to market players being able to optimise their position vis-à-vis network operators. Legal restrictions (particularly on personal data) and security-related factors standing in the way of the publication of network data would also have to be taken into account.

• Data exchange as part of data cooperation can help to make managing network infrastructure in a more efficient way, for instance using virtual platforms that distribute data to the relevant authorised parties. However, this kind of cooperation may also require considerable investment, for example to fulfil IT security requirements or to create standardised interfaces for efficient data exchange. The regulatory framework must promote reasonable and cost-reducing cooperation in the field of data collection and exchange.

Railway sector

• Vertically integrated players in the rail sector are presumed to have access to exclusive infrastructure data, i. e. data that competitors cannot generate by other means or obtain elsewhere. Without appropriate regulatory action, this data can only be used exclusively and could be passed on selectively within a vertically integrated group of companies, potentially creating disadvantages for competitors.

• The data exchange opportunities particularly enable new and improved services in the field of cross-modal transport processes, for instance with respect to telematics, networked mobility or sector coupling. Furthermore, in particular vertically integrated railway undertakings and platform providers in the field of mobility or transport logistics can potentially gain sovereignty over key customer interfaces and thus access to an increasingly wider range of valuable data. Overall, it can be stated that the use of data-based applications to optimise intra-company processes and cost structures is currently less pronounced in the rail markets than in other sectors.

• Furthermore, it may be advantageous for players in the rail sector to enter into data cooperation arrangements. In this context, however, greater attention should be paid to ensuring that such arrangements are non-discriminatory, promote innovation and are as interoperable as possible, with a view to preventing obstacles to competition.

Options for action and outlook

The analysis reveals that data-related issues are often multifaceted and complex. This is largely due to the specific characteristics of data and digital markets. In this context, traditional economic analysis tools are increasingly reaching their limits. From a legal perspective, too, data handling poses challenges. Although the current legislative framework provides for a variety of data property rights, there is no absolute right to data from which specific usage rights can be derived. What is more, numerous different data-related rules and statutory provisions currently exist. The main legal challenge will therefore be developing clear and innovation-friendly regulations conforming to data protection requirements that **guarantee** a reasonable **balance between the various interests of the market players**.

To meet the challenge of creating a regulatory framework for data, it is important to draw on specific analyses of individual cases when assessing obstacles to competition and the suitability of remedies. Depending on the individual market conditions of the relevant sector or business model, the conclusions drawn may well differ.

With a view to creating fair competitive conditions and promoting the value-adding potential of data, there are various regulatory options with, in particular, varying levels of intervention:

- *promoting standardisation and interoperability*
- *imposing transparency obligations*
- *ensuring a level playing field*
- *implementing data portability obligations*
- *establishing rules for access to data (pools)*
- *adjusting unbundling measures*
- *extending market monitoring.*

In assessing whether and which measures are ultimately suitable, it is often necessary to take account of complex interdependencies (including the multilateral nature of markets) and feedback effects (e. g. network effects) as well as possibly conflicting goals, such as consumer protection (and in particular data protection) interests versus the interests of companies in the innovative use of data.

In the digital age, a comprehensive, continual and proactive market monitoring is therefore of decisive importance, because only a comprehensive basis of data and information can provide a proper assessment of the changes and their consequences for regulated network sectors. In view of the growing level of complexity and dynamism in the market, it would also make sense for all the relevant stakeholders (e.g. companies and professional associations) to become even more involved in the market monitoring process. Furthermore, in light of the increasingly blurred borders between markets, it is important to look at whether certain information requirements for market players vis-à-vis regulatory authorities should be extended to adjacent sectors, for instance to players in the digital network economy (e. g. internet platform providers).

4. ACM

ACM, the Dutch regulator, has focused recently on two main issues related to the data economy. An overview of each of the two analysed aspects is provided below.

a) Organisation-wide programme to promote data driven oversight

For nearly two years, ACM has supported an organisation-wide programme to promote data driven oversight. The programme consists of various working groups designing policy advice, organising trainings and events events and communicate with the organisation about the programme and its ambitions. Several projects have been designated as projects of special interest under the programme. These projects are relatively complex because of the volume and/or sensitivity of the data so they provide an opportunity to define best practices.

b) Data managers govern data processes

ACM departments that work with data a lot, have appointed data managers that govern the processes related to data. They ensure that data are collected, stored, distributed and processed according to the relevant laws, policies and best practices. They also keep an overview of the available data.

ANNEX 2 - NATIONAL AND EC DECISIONS/ INVESTIGATIONS RELATING TO THE DATA ECONOMY

Table 2 EC Decisions related to the data economy

Mergers - Reg. No 139/2004		
CASE reference	**Relevant market/s**	**Measures adopted**
M.4731 - Google/Doubleclick (11/3/2008)	Online advertising services	Unconditional clearance (Phase II)
M.4854 – TomTom/TeleAtlas (14/5/2008)	Digital map databases for navigation Portable navigation devices (PNDs)	Unconditional clearance (Phase II)
M.5727 - Microsoft/Yahoo Search Business (18/2/2010)	Internet search Online advertising	Unconditional clearance (Phase I)
M.6314 – Telefónica UK/Vodafone UK/Everyting Everywhere/JV (4/9/2012)	(Mobile) advertising services Data analytics services	Unconditional clearance (Phase II)
M.7023 – Publicis/Omnicom (9/1/2014)	Marketing and communication services Media buying services ("Big") data analytics services	Unconditional clearance (Phase I)
M.7217 - Facebook/Whatsapp (3/10/2014)	Online advertising Instant messaging services	Unconditional clearance (Phase I)
M.8124 – Microsoft/LinkedIn (6/12/2016)	Sales intelligence solutions CRM solutions Online advertising services	Conditional clearance (Phase I) but no remedies regarding the markets for sales intelligence solutions/CRM or online advertising
M.8180 – Verizon/Yahoo! (21/12/2016)	General search services Online advertising services Data analytics services	Unconditional clearance (Phase I)
M.8251 – Bite/Tele2/Telia Lietuva/JV (19/7/2017)	Mobile payment services	Unconditional clearance (Phase I)
M.8788 – Apple/Shazam (6/9/2018)	Digital music distribution services ACR software solutions, including music recognition apps Online advertising services	Unconditional clearance (Phase II)
M.8994 - Microsoft/Github (19/10/2018)	Source and code hosting services for version control and collaboration Development and operations ("DevOps") tools IaaS/PaaS services	Unconditional clearance (Phase I)

Table 3 EC (ongoing) investigations related to the data economy

Cases art. 101 – 102 TFEU		
Case reference	**Relevant market/s**	**Measures adopted**
AT 39740 **Google Search** (abuse of dominant position - art. 102 infringement)	Market for general search services and market for comparison shopping services	Fine; order to bring the abuse to an end within 90 days from the decision's notification in so far as the undertaking has not already done so
AT 40099 **Google Android** (abuse of dominant position - art. 102 infringement)	General internet search services, licensable smart mobile operating systems and app stores for the Android mobile operating system	Fine; order to bring the abuse to an end within 90 days from the decision's notification in so far as the undertaking has not already done so
AT 40411 **Google Adsense** (abuse of dominant position –art.102)	Market for online search advertising intermediation (brokering of online search adverts)	Fine; Google ceased the illegal practices a few months after the Commission issued in July 2016 a Statement of Objections concerning this case. The decision requires Google to, at a minimum, stop its illegal conduct, to the extent it has not already done so, and to refrain from any measure

		that has the same or equivalent object or effect.(IP/19/1770)

Table 4 Data economy related national antitrust decisions

Cases dealt by antitrust authorities (NCAs)		
Case reference	**Abstract**	**Sanction/Adopted measure:**
IT Italy AGCM Facebook – 7 Dec 2018 Breaches of the Italian Consumer Code – misleading and unfair commercial practices	Facebook was fined following the enactment of two unfair commercial practices. 1. Facebook misleads consumers into registering because in the page for registering (Iscriviti) does not provide any reference to the commercial uses of their data operated by the platform, but only to the free offer of social services. 2. Facebook adopts a misleading opt out mechanism (pre-selected function of "Piattaforma attiva"), in order to exchange the data of its users with third party websites and apps. Such a pre-selected system overstates the penalties caused by deselecting the pre-set option.	Facebook was sanctioned 5 million euro for each of the unfair commercial practices enacted.
DE Germany – Bundeskartellamt 6 Febr 2019 Breaches of the German Competition Act (GWB)	The Bundeskartellamt prohibited Facebook (FB) to collect and merge users and device - related data from FB Business tools (API, plug-ins, other analytics services) and from FB's own platforms (WhatsApp and Instagram) without the users' consent. It also prohibited combining the above mentioned data with FB data for purposes related to the social network.	Facebook was ordered to implement changes to its data and cookies policy within twelve months. To such an extent, a period of four months was granted to submit a compliance plan.

ANNEX 3 – TAXONOMY OF DATA IN THE CONTEXT OF THE TELECOMMUNICATION SECTOR

The following tables propose a taxonomy of data regarding the telecommunications sector: it depicts what kind of data the different actors have access to, distinguishing the accuracy of the data collected and the legal status of the collection of such data. Two sub-types of data are distinguished: personal data and network management data.

Figure 2: Tables 5 and 6 labels

Number of circles refers to the accuracy of data collected	
●●●	*Comprehensive access to detailed data*
●●	*Possibility to infer data, or access to accurate data in most cases*
●	*Access to "noisy" data, or to accurate data in very few cases*
	No access to data
Filling of circles refers to the legal status of the access to data	
●	*Access to the data is technically possible and allowed (in some case with prior consent)*
○	*Access to the data is only technically possible*

Table 5: Proposed taxonomy for Personal Data

	Customer Relationship Management data (CRM)	Content data		Metadata		
		Content in Clear text	Encrypted Content	Traffic metadata	VPN Encrypted traffic metadata	Location
Fixed Network Operator	●●● Required to manage the customer	○○○ Have access to content but cannot use it	○ Can only access traffic data and guess content using methods like traffic pattern identification	●●○ Full access to traffic data (source, destination and pattern) if the user consented (but for limited purposes).	○ Hardly any access to data	●●● Exact address of the end-user (through CRM)
Mobile Network Operator	●●● Required to manage the client	○○○ Have access to content but cannot use it	○ Can only access traffic data and guess content using methods like traffic pattern identification	●●○ Full access to traffic data (source, destination and pattern) if the user consented (but for limited purposes).	○ Hardly any access to data	●●○ Access to Cell- location (mobile) if the user consented (but for limited purposes).
(M)VNO	●●● Required to manage the client	○○○ Have access to content but cannot use it	○ Can only access traffic data and guess content using methods like traffic pattern identification	May depend on the specific contractual relationship with the NO (seesection 6.2 for more details)		

OTT service provider[100]	Required to manage the client but could be erroneous	OTT service providers can access the data **for the service they provide**	**Unless they provide End-To-End encryption,** OTT service providers are not affected by the encryption added by their service	OTT service providers have access to traffic data related to their services	Not affected by the VPN	OTT service provider can request an access to GPS coordinate if the user consented
Device manufacturer/OS provider	An account may be used, but info could be erroneous	Can access data before it leaves the device	Can access data before it leaves the device	Can access data before it leaves the device	Can access data before it leaves the device	Has access to GPS coordinate and GSM strength signal

Table 6: Proposed taxonomy for Network Management Data

	(Core) network related data			Radio access network related data (mobile networks only)		
	Usage	Maintenance & Quality	Configuration	Usage	Maintenance & Quality	Configuration & Location
Network operator						
VNO				May depend on the specific contractual relationship with the NO (seesection 6.2 for more details)		
OTT service provider[101]	Can see routes that are used and observe latency on links	Can observe the latency on a given link	Cannot access to core configuration data	By observing bandwidth variation, can infer some usage	Can guess the link quality (e.g. during a call)	Knowing users location and the link quality, may infer data about the location of the towers. Know how often a device communicates with the tower
Device manufacturer/OS provider	Can observe latency on links	Can observe the latency on a given link	Cannot access core network data	Can infer some data about the cell tower usage	Knowing the signal strength, the network operator and the location of the device user, the device operator can draw a map of the areas actually covered by an	Can infer cell towers location, and know how often devices are pinged (see Google example[102])

[100] When the revised ePrivacy regulation will come into force, it is expected that access to data by OTTs and ECS providers will be subject to the same legal constraints.
[101] When the reviesed ePrivacy regulation will come into force, acess to data by OTTs and ECS providers will be subject to the same legal constraints.
[102] Data regarding cell towers (location, quality of signal…) were collected by Android since they were considered as an "additional signal to further improve the speed and performance of message delivery".
See: https://www.theverge.com/2017/11/21/16684818/google-location-tracking-cell-tower-data-android-os-firebase-privacy

					Mobile Network Operator	