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Joint Committee Discussion Paper

on the Use of Big Data by Financial Institutions

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Practical information

EBA, EIOPA, and ESMA (the ESAs) welcome comments on this Discussion Paper on the Use of Big Data by Financial Institutions and in particular on the specific questions set out herein.

Comments can be sent by clicking on the 'respond' button on the ESMA website. Please note that the deadline for the submission of comments is 17 March 2017. Comments submitted after this deadline, or submitted via other means may not be processed.

Comments are most helpful if they:

- respond to the question stated;
- indicate the specific question or point to which a comment relates;
- are supported by a clear rationale;
- provide evidence to support the views expressed/ rationale proposed; and
- reflect a cross-sectoral (banking, insurance, and investment) approach, to the extent possible.

It is important to note that although you may not be able to respond to each and every question, the ESAs would encourage partial responses from stakeholders on those questions that they believe are most relevant to them.

All contributions received will be published following the close of the consultation, unless you request otherwise by ticking the relevant box in the consultation form. Please note that a request to access a confidential response may be submitted in accordance with the ESA's rules on public access to documents. We may consult you if we receive such a request. Any decision we make not to disclose the response is reviewable by the ESA's Board of Appeal and the European Ombudsman.

Executive summary

Rationale and scope

One of the tasks of the European Banking Authority (EBA), the European Securities and Markets Authority (ESMA) and the European Insurance and Occupational Pensions Authority (EIOPA), collectively known as the three European Supervisory Authorities (ESAs), is to monitor any emerging risks for consumers and financial institutions as well as new and existing financial activities and to adopt measures, where needed, with a view to promoting consumer protection and the safety and soundness of markets and convergence in regulatory practices. The coordination of the ESAs' actions in these areas is taking place within the Joint Committee.

In monitoring consumer protection developments and financial innovations, the ESAs have noted the continued increase in the use of Big Data across the banking, insurance and securities sectors, i.e. the collection, processing and use of high volumes of different types of data from various sources, using IT tools, in order to generate ideas, solutions or predict certain events or behaviours (for example to draw actionable insights from these diversified volumes of data in order to profile customers, identify patterns of consumption and make targeted offers). The increase in the use of Big Data has been observed, albeit to varying extents, across the banking, insurance and securities sectors and across different EU Member States.

The ESAs have assessed potential benefits and risks linked to the use of Big Data by financial institutions, with a view to determining at a later stage which, if any, regulatory and/or supervisory actions may be needed to mitigate the risks while at the same time harnessing the potential benefits. The ESAs are issuing this Discussion Paper in order to receive feedback from stakeholders on this preliminary high-level assessment.

Definition and description of the phenomenon

This Discussion Paper starts by defining the scope of this consultation and by describing the Big Data phenomenon as observed by the ESAs. Internet and connected devices have become core elements of our lifestyle. Data is generated, collected, stored, processed and used at unprecedented rates and entire business sectors are being reshaped by building on data analytics. All kinds of activities/products could be impacted, such as profiling consumers, assessing creditworthiness, marketing campaigns, carrying out market segmentation decisions, developing products, pricing products/services, underwriting risk, preventing fraud, undertaking AML/customer identification, increasing internal efficiency within firms, etc.

Potential benefits and risks

The Discussion Paper then presents a preliminary assessment of the potential benefits and risks for consumers and financial institutions. The use of Big Data is likely to transform the way products and

services are provided with benefits for consumers (in terms of products/services better tailored to consumers' needs, better quality or cost-effective services/products) and financial institutions (for instance in terms of more efficient processes and decision-making or better management of risks or fraud situations). At the same time, the use of Big Data could potentially also have an impact on consumers' access to products/services, raise issues around the processing of data and financial institutions' pricing practices (e.g. based on analytical data showing a customer's likely willingness to pay more, or demonstrating his/her inertia to switch products) or decision-making using Big Data technologies, the potential limitations or errors in the data and analytic tools, or security and privacy/ethical concerns, eventually leading to legal and reputational risks for financial institutions. Potential entry barriers in accessing Big Data technologies could also have negative implications on innovation and competition in the financial markets at the detriment of consumers' welfare.

Possible evolution of the market

The Discussion Paper concludes by presenting an overview of the possible evolution of the market. The ESAs are of the view that the phenomenon has the potential to continue to grow and the capacity to use Big Data may be a key determinant of competitive advantage in the future. The adoption of Big Data technologies may change the way financial services are provided. Tech firms may also expand their activities to provide financial services, by leveraging their own technical expertise, innovative and integrated platforms or extensive consumer data or loyalty among millennials. Many financial incumbents understand this reality and are well aware that Big Data related technologies are a potential threat as well as an opportunity for their sector.

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Readers are invited to confirm or challenge the views expressed by the three ESAs, and specific questions are asked at the end of each chapter.

The ESAs will assess the feedback to this Discussion Paper in order to better understand the phenomenon and to decide which, if any, regulatory and/or supervisory action may be required.

Definition and scope

1. The European Commission Communication on Data Driven Economy1 used the term "Big Data" to refer to situations where high volumes of different types of data produced with high velocity from a high number of various types of sources are processed, often in real time, by IT tools (powerful processors, software and algorithms). In general, the Communication[2] proposed to describe Big Data by referring to the three "Vs"[3]:

   - The first "V", "Volume", means a large and fast growing amount of data, especially driven by new forms of mass data (e.g. internet of things, sensors, social media, financial markets data, etc.)[4].

   - The "Variety" of data is mainly a result of the combination of different datasets and sources. It might be, on one hand, the key for new insights and findings because it reveals connections, which were unknown or unused before. On the other hand, it may also appear as one of the most challenging features of Big Data. Data could be structured (following a model that defines a number of fields, what type of data the fields contain, etc., such as a consumer address data base containing information related to each consumer's name, surname, address, phone/e-mail, etc), unstructured (e.g. pictures, videos) or semi-structured (e.g. e-mails), internal or external, personal or anonymized.

   - "Velocity" refers to the quick generation of data as well as to the speed in data processing and the final data evaluation.

2. Advances in IT tools and the ever increasing data availability, including (but not limited to) personal data, enable qualitatively new processing and analytics opportunities. Big Data encompasses not only the data itself but also the technologies and procedures followed to process and analyse the data to unlock income-generating insights, to reveal patterns or correlations, to generate new ideas or solutions or, importantly, to predict future events in a more accurate and timely manner. While the term Big Data is often considered to be a synonym of "predictive analytics", which involves finding patterns and correlations between large, and

1 European Commission Communication on Data Driven Economy, July 2014, COM(2014)442 final.
2 The identification via the 3Vs has been used by other regulators or bodies (UK FCA in their November 2015 call for inputs on Big data in retail general insurance, the October 2015 IFC Report on Central banks' use of and interest in big data). See other older references to big data and the 3Vs: META Group, 3D Management controlling data volume, velocity and variety, Gartner 2001; Global Pulse, Big Data for Development: Challenges and Opportunities, 2012.
3 Other research papers suggest that features such as the "Value" or "Veracity" of the datasets are also important components of the concept of Big Data.
4 Estimates suggests that the worldwide data volume in 2020 will increase over 100 zetabytes.

often diverse, datasets and thereby make predictions[5],this Discussion Paper covers various types of data analysis (e.g. descriptive, predictive or prescriptive[6]).

3. In line with the Communication on Data Driven Economy, this Discussion Paper does not focus on traditional data mining tools designed to handle mainly low-variety, small scale and static datasets, often manually. Moreover, tools asking prospective customers for information about their specific circumstances and whereby an algorithm recommends a transaction solely based on the answers provided by customers are also not the focus of this Discussion Paper (DP). However, where such automated tools would make use of other sources of data, other than the sole information provided specifically by the client, and comply with the previous commented characteristics that define Big Data, they would then fall in the remit of this DP.

4. It should be also noted that the main focus of this DP is the use of Big Data by financial institutions which has an impact on their processes, on services provided to their clients or on their relationship to clients.

Description of the phenomenon

5. As mentioned above, this Discussion Paper has a comprehensive approach to capture the collection and use of data, including the analytical methods and technologies used. Big Data is a phenomenon not based on a single technology, but rather a result of a whole string of innovations in several areas. What these innovations all have in common is that they use the volume, variety and velocity of data to derive economic benefit from it.

6. Internet and mobile/connected devices have become core elements of our lifestyle. The ways in which data is generated, collected, stored, processed and used have evolved at unprecedented rates and entire business sectors are being reshaped by building on data analytics. With decreased costs of computing and storage and increased capabilities to analyse large sets of data, the use of Big Data is increasing across a variety of sectors. Financial services are awash in data. While financial institutions have always used data, the type and sources of data as well as the use and type of data analytics tools is growing exponentially. The penetration of technology-driven applications in almost every segment of the value chain of the financial services sectors has accelerated the pace of change at a remarkable rate[7]. The use of Big Data has been evidenced to varying extents in the banking, insurance and securities sectors. Taking

5 "One of the greatest values of Big Data (…) is derived from the monitoring of human behaviour, collectively and individually, and resides in its predictive potential", EDPS Opinion 7/2015.
6 Descriptive analytics use data aggregation and data mining to provide insights into the past and answer what has happened; predictive analytics use a variety of statistical models, data mining, machine learning or forecasts techniques to understand the future and answer what could happen; prescriptive analytics goes beyond descriptive and predictive models by recommending one or more courses of action and showing the likely outcome of each decision.
7 Blurred lines: How Fintech is shaping Financial Services, PWC Global FinTech Report, March 2016.

this evidence into account, the ESAs have identified certain key characteristics of the Big Data phenomenon.

Purposes / business models

Type of firms using Big Data

7. Despite its relative novelty, the use of Big Data is very likely to increase and spread across various/all types of financial institutions as they realise these developments, and their potential benefits, may impact their competitive position in the market. As many consumers become accustomed to the digital experience offered by various tech/digital companies, they are likely to expect the same level of customer experience from their financial services providers. Data-driven technologies may help meet the needs of digital native clientele as well as reshape the value proposition of existing financial products and services[8].

8. Financial institutions across the banking, insurance and investment sectors have already started using Big Data techniques. For example, aggregator services use financial and payment data from bank accounts of consumers for dashboard and accounting products. Banks use financial and payment data for consumer credit worthiness. Account Initiation services (AIS) already exist today and are expected to proliferate even further once they are subject to the requirements in the Payment Services Directive[9]. In the insurance sector, telematics boxes in cars monitoring driving behaviour are being applied to offer individualized policies and prices according to the customer's driving behaviour. Smart (connected) homes and wearable devices in the health sector may lead to more granular segmentation of risks, pricing more risk-based, and increase the effectiveness of risk-selections. In the securities sector, the business model of institutions such as High Frequency Traders has already been based on the analysis of large volumes of data, from a wide variety of datasets, at very high velocity through the use of algorithms to make investment decisions. Asset managers' operations are also increasingly using Big Data technologies to inform their investment strategies or for their financial risk management. Some investment funds have developed sophisticated strategies which include non-traditional data ranging from social media news to satellite images[10]. More broadly, the concept of financial analysis is set to change with Big Data as financial analysts are likely to exploit increasingly these non-traditional data sources in addition to economic reports, quarterly results, etc. Big Data may be used by institutions with a variety of business models, both traditional institutions and newcomers, to gain from innovation and improve their competitiveness[11]. Therefore if financial

8 See PWC Report quoted above.
9 Directive (EU) 2015/2366 on payment services in the internal market (PSD2).
10 By way of example, certain indexes are developed based on satellite images; similarly, a firm providing commodity traders with analysis based on satellite observations and shipping data launched a hedge fund. Financial Times, Investors mine Big Data for cutting-edge strategies, March 30, 2016.
11 Sometimes Fintechs are challenging incumbent providers and in some cases are themselves being bought up by incumbent providers because the latter feel their business models are increasingly coming under threat. Based on a 2016 PWC Global FinTech survey (distributed to various segments of the FS industry, such as payments, banking, insurance, asset management), 32% of respondents engage in joint partnerships with Fintech companies, 9% acquire them and 22% buy and sell services to Fintech companies.

conglomerates and Fintech firms appear as natural candidates for using Big Data, the capacity of incumbents to assimilate innovative ideas should not be underestimated[12].

9. Other non-regulated entities (e.g. IT firms or digital firms) may leverage their access to large data sets and client base or know-how in relation to data-driven technologies and may therefore play an important role as either partners for financial institutions or future competitors in the financial services markets.

Purposes of the use of Big Data

10. All kinds of financial activities/products could be impacted as the use of Big Data technologies may serve various purposes: profile consumers, customer loyalty management (including monitoring consumer sentiment towards products/institutions), creditworthiness assessments, marketing campaigns, market segmentation decisions, product development, other risk assessment, suitability/appropriateness tests, demands and needs tests, pricing products/services, underwriting risk, fraud prevention, AML/customer identification, increase internal efficiency within firms, help business decision-making, support finance and risk control activities, assess selling processes/distribution, increase revenues through the commercialisation of data, etc.

11. The use of Big Data may also enable financial institutions to cross-sell various products/services (especially in the case of financial conglomerates), develop behavioural-based services, design investment strategies that can evolve in real time, support compliance with regulatory requirements by firms (including by analysing data from various reporting sources such as EMIR, MiFID, Solvency II, CRD IV, etc.) or back-test software solutions[13].

Type and sources of data

12. The data that is collected and used may vary across firms and purposes. Various types of consumer data are collected and used by firms (e.g. id or contact details, browsing history, log data, professional data, personal interests, financial and payment data, consumer complaints or queries, social network information, driving and location data, information from store cards/credit cards, data collected for suitability assessments or data collected for creditworthiness assessments). While the collection and use of social media data is growing, it is important to bear in mind particular data protection requirements and issues around the legitimacy of such use. In addition to consumer data, other types of data such as financial markets data, news, price, etc. are also increasingly available in real time and are seamlessly integrated into financial institutions' Big Data related processes. Data may come from both internal (such as payments data, claims or complaints databases, information on settings and

12 Moreover, some firms may already use Big Data but may not publish this in order to avoid reputational risks and/or actions by competitors.

13 The goal of back-testing is to estimate the performance of a strategy as if it had been employed during a prior period. This requires simulating past conditions with sufficient detail, making one limitation of back-testing the need for detailed historical data.

parameters set by clients, etc.) or external sources (news, social media, flood risk maps, data from other financial and non-financial sectors, criminal records or other private[14] or publicly[15] available data sources). In certain instances, in particular when speaking about personal data, internal sources (derived from relationships with customers, with data provided either directly, when the client applies for a service, or indirectly, through the customer's behavior in financial operations) may currently be more common. Some of these data items are mandated in the regulatory framework (like in the case of MIFID or IDD requirements for investment firms and respectively insurance intermediaries and undertakings to collect information to assess, in certain cases, the financial situation, knowledge, experience or investment objectives of the consumer, or data on payments used for anti-money laundering purposes). At the same time, it is important to stress that data sources are expanding exponentially and certain institutions appear to already have access to an increasing set of sources. Data obtained through the internet of things, sensors, etc. will be more and more used[16].

13. As mentioned above, data may be structured, semi-structured or unstructured (even if using unstructured data might raise more IT/technical issues)[17]. The way in which data is processed (e.g. anonymized, aggregated) may depend on the type of data and the purpose of the data processing (e.g. for product development or statistical purposes anonymised/aggregated data may be more current while for other purposes personal data is more useful, e.g. in the case of behaviour-based insurance products or direct customer contact). Certain IT technologies (Data Warehouse or Customer Relationship Management) are specialised in the complex and massive processing of consumers' data; these tools being used to obtain aggregated data related to the behaviour and acceptance of the products and services offered by some entities and to the selection of clients to whom offer a specific product or service.

Scale of the market and market concentration

14 For instance, commercial data aggregators/vendors, blogs, etc. The EDPS Preliminary Opinion on 'Privacy and competitiveness in the age of big data (March 2014) described data or information brokers as undertakings collecting personal information about consumers and selling that information to other organisations using a variety of public and non-public sources including courthouse records, website cookies and loyalty card programs to create profiles of individuals for marketing purposes, and sell them to businesses who want to target their advertisements and special offers. The EDPS added that, apart from the general rights to access applicable under the Data Protection Directive (to be replaced by the GDPR which includes provisions on data portability) there was no existing legislation that explicitly required a data broker to share with their customers either the information they have gathered or the customer profiles developed using those data. In the US this industry is the subject of ongoing enforcement, information-gathering and awareness raising activities by the Federal Trade Commission; see http://www.ftc.gov/sites/default/files/documents/public_statements/prepared-statement-federal-tradecommission-entitled-what-information-do-data-brokers-have-consumers/131218databrokerstestimony.pdf

15 Examples of publicly available data sources may be: registries of debtors/creditors, companies' registries, data & statistical agencies.

16 See survey showing that certain consumers would be willing to wear sensors/devices if it leads to lower premiums, PwC Insurance 2020: The digital prize – Taking customer connection to a new level.

17 Certain financial institutions (see the European Banking Federation's Response to the EBA DP on innovative uses of consumer data) have also mentioned that there are certain areas in which financial institutions (banks) also rely on "managed/treated data", data which has undergone a thorough process and analysis conducted by banks (such as verification, cybersecurity etc.).

14. While there are no clear statistics or data on the exact number of EU financial institutions using Big Data or on the market share of the key users/owners of Big Data technologies, there is evidence that some financial institutions are using or planning to use Big Data solutions. The fact that Chief Data Officers are increasingly being appointed within financial institutions could be seen as an illustrative example of (amongst other, often broader, data governance matters) the increasing importance of Big Data analytics[18]. Also, there is evidence of an increasing number of cooperation agreements / joint ventures between different actors (including non-financial/non-regulated actors) for the use of Big Data[19].

15. There is also relatively limited information on the potential for the use of Big Data to increase fragmentation or concentration of the distribution chain in the financial sector. At the same time, data has become a substantial intangible asset used for the purposes of value creation and often can be a company's most valuable asset[20]. This can spur discussions about the role of data in economic relationships and in the emergence of a number of firms[21] that achieve significant turnovers based on business models based on the commercial use of data and of Big Data technologies[22]. The lack of access to certain important datasets could therefore act as a barrier to new institutions entering the market or even existing ones remaining on the market. Entry barriers could reduce innovation and competition among products and services, and, as a result, consumers could face higher prices, poorer quality of products and services, reduced choice or other non-price features, including privacy protection.

Questions:

1. Do you agree with the above description of the Big Data phenomenon? If not, please explain why. Please also mention whether you consider that other characteristics are relevant to understanding the use of Big Data.

2. Which financial products/activities are (likely to be) the most impacted by the use of Big Data and which type of entities (e.g. large, small, traditional financial institutions, Fintechs, etc.) are making more use of Big Data technologies? In light of ESAs' objective to contribute to the stability and effectiveness of the financial system, to prevent regulatory arbitrage, do

18 More insurers create data officer role, Insurance ERM, 27 April 2016, https://www.insuranceerm.com/news-comment/more-insurers-create-data-officer-role.html.

19 The insurance industry's new policy: Get digital, Financial News, 5 May 2016, http://www.efinancialnews.com/story/2016-05-05/insurance-industry-gets-digital; see also arrangements for instance between telematics and insurance companies; in the context of claims management between some insurance undertakings and smart home solutions providers; between price comparison websites and certain financial sectors are the use of certain data; financial institutions and big IT providers having the know-how, the skills and the equipment; between some financial institutions, tech and software companies and research institutions for the development, use or study of Big Data technologies or even joint government-industry projects to develop the sector.

20 EDPS Preliminary opinion on privacy and competitiveness in the age of big data, March 2014.

21 Certain digital players are building huge datasets for commercial purposes which, in time, may increase the data concentration risk or the fact that the perceived value or potential value of data may, of itself, create barriers to the wider use of that data (if the data has a perceived commercial value then a firm that holds the information may be incentivised not to share it on the basis that its value is reduced every time it is shared).

22 Competition law and data, Autorite de la Concurrence & Bundeskartellamt, May 2016.

you consider that there is a level playing field between financial institutions using Big Data processes and those not using them (e.g. because they do not have access to data or the (IT) resources needed to implement Big Data processes) or between established financial institutions and potential new entrants (e.g. Fintechs) using Big Data processes? Please explain.

3. Do you offer/are you considering using Big Data tools as part of your business model? If so, please briefly describe: i) what type of entity you are, e.g., long established, start-up, a product provider, an intermediary; ii) the service you provide; iii) the nature of your clients; iv) your business model; v) whether the Big Data tools/strategy were developed by an external company or internally and whether you have related agreements with other entities (including non-financial entities)[23]; vi) what are the types of data used (personal, anonymised, user data, statistical data etc.) sources of data; and vii) the size of your Big Data related activity and/or forecast activity (e.g. to what extent are business decisions already taken on the basis of Big Data analysis; what other business actions could be based on Big Data in the future)?

4. If you are a consumer or a consumer organisation, do you witness any of the uses of Big Data? In what fields?

5. Do you consider there are (non-regulatory) barriers preventing you (or which could prevent you in the future) from collecting and processing data? Are there barriers preventing you from offering/developing Big Data tools in the banking, insurance and securities sectors? If so, which barriers?

23 Please note that you are not requested to provide the name of those entities.

Regulatory framework applicable to Big Data

16. EU approaches to data protection, competition and consumer protection share common goals, including the promotion of growth, innovation and the welfare of individual consumers[24]. Financial institutions using Big Data should consider whether their approach to Big Data is compliant with several horizontal data protection and consumer protection requirements and sectoral financial legislation. Without aiming to provide an exhaustive overview of the applicable rules or a judgement on the extent to which certain uses of Big Data are compliant with these rules, the following requirements should be carefully considered when applying Big Data technologies[25]. The fact that certain other regulatory aspects are not highlighted in this Discussion Paper does not mean that they may not be relevant for financial institutions using Big Data technologies.

Data protection requirements[26]

17. Several existing key **data protection** principles may impact on the processing of consumers' personal data[27], including how data is collected, from what sources, how well informed consumers are about the processing and whether they consent to it. In particular, any processing of personal data must be lawful and fair to the consumers concerned. The data must be accurate and up-to date, adequate, relevant and not excessive in relation to the purposes for which they are processed. This implies that, while the nature of Big Data encourages the use of as much data as possible to see what connections can be made, financial institutions should be able to justify the use of certain data categories as well as ensure the data is accurate and updated over time. Also, as any further processing should not be incompatible with the purposes originally specified when data was collected, financial institutions should assess the extent to

24 Privacy and competitiveness in the age of big data: The interplay between data protection, competition law and consumer protection in the Digital Economy, Preliminary Opinion of the European Data Protection Supervisor, March 2014.
25 Other essential data protection related provisions may be found in the Treaty (Art 16 TFEU) or the Charter of Fundamental Rights (in particular Art 7 and Art 8). Article 38 of the Charter requires EU policies to ensure a high level of consumer protection, while Article 12 TFEU requires consumer protection to be taken into account in defining and implementing EU policies and activities generally. Moreover, Article 169 TFEU states that the EU should contribute to the protection of the health, safety and economic interests of consumers.
26 Data Protection Directive 95/46/EC (repealed by the General Data Protection Regulation (EU) 2016/679 (GDPR) starting to apply from May 2018); Directive 2002/58/EC concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications).
27 Personal data is defined as any information relating to an identified or identifiable natural person ('data subject'); an identifiable person is one who can be identified, directly or indirectly, in particular by reference to an identification number or to one or more factors specific to his physical, physiological, mental, economic, cultural or social identity.

which they could use, for instance, purchased data for own purposes (e.g. to gain insights into risk allocation for insurance purposes[28]).

18. The processing of personal data must in principle be carried out with the unambiguous consent[29] of the data subject (or be necessary for the conclusion or performance of a contract binding on the data subject, or as a legal requirement, etc.)[30].

19. Consumers must be able to exercise the right of access to data relating to them which is being processed, in order to verify the accuracy of the data and the lawfulness of the processing, to request corrections or even to object to processing in certain circumstances. Consumers also have the right to know the logic involved in the automatic processing[31] of data concerning them, at least in the case of the automated decisions[32]. It is therefore important for financial institutions using Big Data to consider from the outset how they can effectively respond to such requests.

20. The protection of consumers' rights with regard to the processing of personal data also requires that appropriate technical and organisational measures be taken, both at the time of the design of the processing system and at the time of the processing itself, particularly in order to maintain security and to prevent any unauthorised processing.

21. The newly adopted General Data Protection Regulation (GDPR)[33] is also likely to impact the use of Big Data by financial institutions (and any other entities). The GDPR will establish stronger rights for consumers (access and correction of personal data, an explicit right to be forgotten, a right to object to data processing, the right to be informed when data security is breached or better information on firms' data protection policies). Also, a new right to data portability will allow consumers to receive their personal data from one service provider in a structured, commonly used and machine-readable format and move it to another. This could also enable certain financial institutions to access certain markets which might be otherwise dominated by other undertakings. New provisions on profiling allow, subject to certain conditions, the data subject to unsubscribe/opt out from decisions based on profiling. The data subject will also be able to ask the organisation for a human being to intervene in the profiling, to contest a decision based on profiling, and to object to profiling for direct marketing purposes. In order to ensure

28 UK Information Commissioner's response to the Financial Conduct Authority's call for inputs on big data in retail general insurance, January 2016.

29 This consent must be an explicit consent where the processing concerns personal data revealing for instance racial or ethnic origin, political opinions, religious or philosophical beliefs or data concerning health or sex life. The GDPR has strengthened the conditions for consent.

30 The Data Protection Directive specified that Member States may determine the circumstances in which personal data may be used or disclosed to a third party in the context of the legitimate ordinary business activities of companies and other bodies and that Member States may similarly specify the conditions under which personal data may be disclosed to a third party for the purposes of marketing, whether carried out commercially or not, subject to the provisions allowing a data subject to object to the processing of data regarding him, at no cost and without having to state his reasons.

31 This is even more relevant for any financial institution using machine learning technologies.

32 It should also be noted that, subject to certain conditions, consumers have the right to require that no decision significantly affecting them is made solely by automatic means (Art. 15 Data Protection Directive 65/46/EC).

33 Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

the fair and transparent processing of data, data subject shall be informed about the existence of automated decision making, including profiling, meaningful information about the logic involved, as well as the significance and the envisaged consequences of such processing. Moreover, the establishment of the principle "data protection by design and by default'' will incentivise businesses to innovate and develop new ideas, methods, and technologies for security and protection of personal data. The Regulation promotes techniques such as anonymisation (removing personally identifiable information where it is not needed), pseudonymisation (replacing personally identifiable material with artificial identifiers), and encryption (encoding messages so only those authorised can read it) to protect personal data. The use of one or another security technique should be done on account of the state of the art and the costs of implementation in relation to the risks and the nature of the personal data to be protected. Insofar the new rules provide more clarity on the due diligence that entities are expected to observe when dealing with personal data, they are likely to encourage the use of "big data" analytics, by using anonymised or pseudonymised data[34].

22. Another relevant piece of legislation is the Directive 2002/58/EC concerning the processing of personal data and the protection of privacy in the electronic communications sector. The Directive sets out rules to ensure security in the processing of personal data, the notification of personal data breaches, and confidentiality of communications[35]. It also bans unsolicited communications where the user has not given their consent.

23. Also, cybersecurity issues and risks are becoming an important factor that financial institutions need to address in an appropriate way. In this sense, steps are being taken at an European level to tackle these issues and risks within the framework of the EU Cybersecurity Strategy (e.g. adoption of the Directive 2016/1148 on Security of Network and Information Systems [the NIS Directive] by the European Parliament on 6 July 2016), which establishes that operators of essential services (e.g. credit institutions, financial market infrastructures) will have to take appropriate security measures to manage the risks posed to the security of network and information systems which they use in their operations and to notify serious incidents to the relevant national authority.

24. Overall, in order to ensure compliance with the above requirements but also to preserve consumers' trust, it appears essential for any financial institution looking to use Big Data to be transparent about data processing. Financial institutions should assess how best to communicate clear, meaningful, information about the data processing and the use of Big Data tools to consumers. They should constantly bear in mind consumers' expectations about how data is used[36], even where the processing concerns data that is not personal or data that has been anonymised or is publicly available. They should carefully consider the legal and

34 European Commission, Questions and Answers - Data protection reform, Brussels, 21 December 2015, http://europa.eu/rapid/press-release_MEMO-15-6385_en.htm.
35 The rules may provide various protections concerning the use of cookies or similar technologies to store information or access stored information on a user's device.
36 69% of Europeans are concerned that their personal data held by companies may be used for a purpose other than that for which it was collected, Special Eurobarometer 431, Data Protection, June 2015.

reputational dimensions of processing social media data, and in particular how individuals may feel if they knew social media content about them was being used[37]. They must also be mindful of the varied level of understanding and application of privacy settings on social media accounts and bear in mind that some users may not realise that social media data relating to them is potentially available to be obtained from the internet. Data protection bodies have explicitly referred to these risks and advised financial institutions to consider whether they have legitimate grounds to use data that may have been gathered from social media platforms or other online sources for insurance purposes, rather than merely relying on the fact that some content is accessible [38].

Consumer protection requirements

25. Financial institutions using Big Data should also be mindful of several consumer protection principles. For instance, the Unfair Commercial Practices Directive[39] prohibits unfair commercial practices which are contrary to the requirements of professional diligence and are likely to distort the economic behavior of the consumer. These can be misleading actions[40] or omissions as well as aggressive practices[41], including making persistent and unwanted solicitations by telephone, e-mail or other media or requiring a consumer who wishes to claim on an insurance policy to produce documents which could not reasonably be considered relevant as to whether the claim was valid.

26. The Directive on Distance Marketing of Financial Services[42] lays down certain essential standards for distance marketing techniques. Abusive marketing practices seeking to oblige consumers to buy a service they have not solicited are banned, while rules are set out to restrict other practices such as unsolicited phone calls and e-mails ("coldcalling" and "spamming"). The Directive also establishes an obligation for services providers to provide consumers with comprehensive information before a contract is concluded and the right for the consumer to withdraw from the contract during a cooling-off period[43].

37 81% of Europeans feel that they do not have complete control over their personal data online - Eurobarometer, 2015.
38 The UK Information Commissioner's response to the Financial Conduct Authority's call for inputs on big data in retail general insurance.
39 Directive 2005/29/EC of 11 May 2005 concerning unfair business-to-consumer commercial practices.
40 Misleading practices could relate to either the characteristics of products/services (benefits, risks, etc), the motives for the commercial practice and the nature of the sales process, the price or the manner in which the price is calculated, the need for a service, etc (Art 6).
41 In determining whether a commercial practice uses harassment, coercion or undue influence, account is taken of the timing, nature or persistence of the practice, the exploitation by the firm of any circumstance of which the firm is aware, any onerous or disproportionate non-contractual barriers imposed by the firm where the consumer wishes to exercise rights under the contract, including rights to terminate the contract or to switch to another product/firm (Art 9).
42 Directive 2002/65/EC on distance marketing of consumer financial services.
43 Nevertheless, certain EU Directives (such as the CCD, the PSD, the MCD) disapply some provisions of Directive 2002/65/EC concerning the right of withdrawal (see Art. 14 (5) CCD, Art. 14 (6) MCD) and prior information requirements (Art. 31 PSD). Art 6(2) of the Directive on Distance Marketing of Financial Services also disapplies the right of withdrawal in relation to investment services.

27. The Misleading and Comparative Advertising Directive[44] requires Member States to take steps to combat misleading advertising and permits comparative advertising on condition that it is objective and does not create confusion between traders and competitors. The Directive on Unfair Contract Terms[45] emphasised the notion of 'good faith' and required contract terms to be drafted in plain and intelligible language, with any doubt about the meaning of a term to be interpreted in favour of the consumer.

Sectoral financial requirements

28. Sectoral financial legislation is in principle technology neutral and as such does not specifically deal with Big Data related matters. However, several provisions within EU financial legislation (such as the Payment Services Directive, the Mortgage Credit Directive, the Consumer Credit Directive, the Payment Accounts Directive, PRIIPS, the Insurance Distribution Directive, MiFIDII/MiFIR, UCITS, AIFMD, EMIR, Solvency II, CRD IV) are particularly relevant for financial institutions using Big Data technologies.

29. These instruments include various prudential and organisational obligations relevant, while not drafted with Big Data technologies in mind, for financial institutions using Big Data technologies, such as:

- establishing and operating sound internal control mechanisms, effective procedures for risk assessment and effective control and safeguard arrangements for information processing systems. These requirements are essential for business processes using Big Data technologies and implying continuous adaptation to changing market/IT developments[46];
- ensuring continuity and regularity in the performance of their activities (and employing appropriate and proportionate systems, resources and procedures to this end). Complying with these provisions is important in order to mitigate any challenges resulting from the implementation of Big Data processes[47];

44 Directive 2006/114/EC of 12 December 2006 concerning misleading and comparative advertising. Since the implementation of the Directive on Unfair Commercial Practices the scope of application of the Misleading and Comparative Advertising Directive has been restricted to business-to-business (B2B) relations concerning misleading advertising. Its provisions on comparative advertising however also apply in the context of advertising directed at consumers.

45 Directive 93/13/EEC on unfair terms in consumer contracts.

46 See Article 13(5) MiFID I, Article 18 AIFMD, Article 12 UCITS. See also Article 41 Solvency II requiring all insurance and reinsurance undertakings to have in place an effective system of governance which provides for sound and prudent management of the business. CRD IV also establishes general obligations related to governance arrangements, adequate internal control mechanisms, sound administration and accounting procedures that are consistent with and promote sound and effective risk management.

47 Article 17 MiFID II explicitly requires for instance investment firms engaging in algorithmic trading to have effective business continuity arrangements to deal with any failure of its trading systems and to ensure systems are fully tested and properly monitored. Or, under Art 95 PSD2, payment service providers should establish a framework with appropriate mitigation measures and control mechanisms to manage any operational and security risks, relating to the payment services they provide. As part of that framework, payment service providers shall establish and maintain effective incident management procedures, including for the detection and classification of major operational and security incidents.

- monitoring markets activity, mitigating against counterparty or systemic risk or disorderly trading (which might arise when using Big Data technologies)[48];
- ensuring that any reliance on a third party (outsourcing) does not impair the quality and the continuous performance of services[49]. This is particularly relevant when financial institutions engage into cooperation agreements with Fintechs or data/IT services providers to develop Big Data technologies;
- taking steps to identify, prevent and manage conflicts of interests (which might arise for instance from embedded biases or flaws in Big Data tools favouring firm's interests or certain clients over other clients)[50],
- maintaining comprehensive records to reconstruct efficiently and evaluate the Big Data strategies/tools employed and ascertain firms' compliance with all regulatory requirements when providing services to consumers[51],
- establishing fair and efficient claims and complaints handling processes[52]. This requirement is relevant to ensuring that Big Data analytics (predicting more accurately those consumers more likely to lodge a claim/complaint or shop around) do not lead to consumer detriment.

30. Several conduct of business principles are also relevant to the use of Big Data, such as:

- acting honestly, fairly and professionally in accordance with the best interests of clients[53]. While Big Data analytics should allow financial institutions to have greater insights about their customers and their interests, and therefore enable them to enhance the quality of their practices and services offered to customers, they should always be mindful of their duty to treat customers in a fair and professional manner;
- ensuring all information, including marketing communications, addressed by firms to clients should be fair, clear and not misleading, including when financial institutions use Big Data to launch targeted marketing and communication campaigns;
- providing clients, in a comprehensible form, with appropriate information about the firm and its services, where relevant the proposed investment strategies, risks associated with those services, products or strategies, costs and charges; such information should enable clients to make informed investment decisions in relation to products/services which involve the use of Big Data technologies[54];
- assessing certain minimum, accurate and up-to-date, information about clients and products/services before providing certain services (e.g. suitability or appropriateness tests

48 See MiFID II provisions aimed at investment firms and trading venues to ensure robust measures are in place to ensure that algorithmic trading or HFT do not create a disorderly market and cannot be used for abusive purposes.
49 See Articles 13 MiFID I (Article 16 MiFID II), or Article 13 UCITS.
50 Art. 18 MiFID I (Art 23 MiFID II), Art 17, 27 and 28 IDD, Art 7(3) MCD,
51 See Article 13(6) MiFID I; see also new Article 17 MiFID II concerning algorithmic strategies.
52 See for instance Article 14 IDD; Article 10 MiFID I implementing Directive (future Article 26 in the MiFID II Delegated Regulation) requires firms to establish, implement and maintain effective and transparent procedures for the prompt handling of complaints.
53 See Art 19 MiFID I (future art 24 MifID II), Art 12 AIFMD, Art 14 UCITS Directive, Art 17 IDD, Art 7 MCD.
54 Art 18 MCD for instance explicitly requires creditors to inform consumers that decisions on credit applications are based on automated processing of data.

or creditworthiness assessments)[55]. These obligations are relevant to firms using Big Data and could be facilitated by sound Big Data tools;

- manufacturing and distributing products/services which are meant to meet the needs of identified target clients[56]; compliance with these requirements could benefit from the use of Big Data technologies helping firms understand their client base and monitor products are distributed accordingly;
- preserving the interests of consumers (in particular client mobility and ability to make informed choices)[57]. These provisions should prevent firms from using Big Data in order to push for bundled or tied packages of products which might not be in the best interest of clients.

31. The Anti-Money Laundering Directive 2015/849 (AMLD) also requires certain levels of customer due diligence, and in particular the obligation to collect information about the customer to prevent money laundering, such as conducting ongoing monitoring of the business relationship including "identifying the customer and verifying the customer's identity on the basis of documents, data or information obtained from a reliable and independent source" or the "scrutiny of transactions undertaken throughout the course of that relationship to ensure that the transactions being conducted are consistent with the obliged entity's knowledge of the customer, the business and risk profile, including where necessary the source of funds and ensuring that the documents, data or information held are kept up-to-date"[58].

32. In general, all these financial legislations also foresee for specific data protection rules[59].

33. While the ongoing adoption and implementation of Big Data technologies by various financial institutions would prima facie lead to think that the above regulatory frameworks are flexible enough to cover Big Data, the ESAs are interested to receive feedback on these frameworks and their potential impact on the use of Big Data technologies.

Questions:

6. Do you agree with the above short, non-exhaustive, presentation of some of the main applicable requirements? If not, please explain why. Please also mention whether you consider that other legal requirements are essential and should be mentioned.

7. Do you consider any of these regulatory requirements as unjustified barriers preventing you from using Big Data technologies? If so, please explain why. Please also explain whether you consider that further regulation (including soft law/guidance, etc. and insofar as it falls within the scope/remit of the ESAs) should be introduced to facilitate the use of Big Data technologies.

55 See Article 19 MiFID I (future Art 25 MiFID II), Art 30 IDD, Art 22 MCD.
56 Articles 16(3) and 24(2) MiFID II, Article 25 IDD, EBA Guidelines on product oversight and governance requirements for manufactures and distributors of retail banking products, July 2015.
57 See Art. 24(11) MiFID II, Art 24 IDD, Art 12 MCD, Art 8 PAD.
58 Art 13 AMLD.
59 Art 78 MiFID II, Art 104a UCITS Directive, Art 37 IDD, Art 94 PSD2, Art 62 CRD IV.

Potential benefits and risks for consumers and financial institutions

34. The use of Big Data by financial institutions can present potential benefits[60] and risks for consumers and financial institutions (and even for the financial system more generally). For instance, the possibility to achieve more granular segmentations could lead to certain benefits for consumers and financial institutions in terms of more personalised products/services but could also raise questions in terms of its potential to limit the access to certain services (or at certain conditions) or exclude certain categories of consumers. In the same vein, Big Data tools may impact the quality of processes, products and services, lead to increased revenues or lower costs for consumers and financial institutions, improve regulatory compliance or fraud detection. Such use could however also have certain budget and resources implications, amplify cybersecurity or litigation risks or raise broader ethical considerations.

Potential benefits and risks linked to more granular segmentations

Potential benefits for consumers in terms of more personalised products and services

35. An increasing trend amongst financial institutions is to use Big Data to profile customers and identify patterns of consumption in order to make targeted offers and personalise products and services.

36. By using Big Data, financial institutions can collect extensive information about customers and their risk profiles and therefore proceed with a risk micro-segmentation/refined credit scoring or refined assessment of the suitability of an investment. In the insurance sector, firms will be able to use detailed information about their costumers to offer tailored insurance policies, calculate more personalised premiums and lower the cost of insurance for low-risk policyholders. Usage-based insurance models (e.g. pay as you go auto-insurance) are emerging and may improve their accuracy due to telematics-based solutions. Similarly, in the banking sector, the ability to better assess the risk of granting a credit to a consumer may be better understood and accordingly priced more accurately leading to better credit conditions for certain customers.

37. Financial institutions could also be able to offer products/services to consumers who, in the absence of more detailed information, would have been considered undesirable. For example, traditional risk segmentations based on zip-codes may progressively be substituted in some areas by satellite images or heat maps, allowing more accurate determinations of which real estate properties are more prone to be affected by floods and which ones are not. The latter

60 The potential benefits set out below are based on the prior assumption that the Big Data mechanisms are technologically robust and serve the purposes for which they were designed.

may therefore be offered insurance coverage at conditions which in the past could not have been possible.

Risks related to access to financial services because of granular segmentations

38. More granular segmentations could however also lead to access issues for some consumers classified as undesirable. For example, in the insurance sector, the result of a more granular risk segmentation could lead either to higher premiums for certain customers or to certain customers (with high risks or unusual profiles) having difficulties accessing (certain types of) insurance cover. This could create difficulties for consumers seeking household insurance for real estate properties located in geographical areas exposed to high risks such as floods, earthquakes or crime. The latter could eventually have broader social consequences and require action protecting the general good, since obtaining household insurance is a legal requirement in several Member States for renting or owning real estate properties[61]. The increasing individualisation of risk profiles could have, to a certain extent, implications for the principle of solidarity and risk pooling in the insurance sector. In the same vein, conditions for obtaining a mortgage credit could deteriorate for certain customers, or even limit access to credit[62].

39. Firms' price adjustments based on consumer features and behaviour-based factors could go against financial institutions' overarching obligation to treat customers in a fair and non-discriminatory manner[63]. This could be particularly the case when insufficient transparency and disclosure measures about the pricing and segmentation criteria as well as the data sources used by financial institutions when profiling customers are in place[64].

40. Behavioural data could make it easier, in future, for companies to charge different prices/premiums for the same product/service to customers within the same target group (i.e. clients investing in the same product through similar distribution channels/services or respectively customers with similar risk profiles), based on individuals' willingness to switch products/providers or likelihood to pay more. This could lead to undesirable consumer outcomes. Such pricing practices could exist even in markets with many firms, or where firms compete on price for some customers. The exploitation of brand loyalty, inertia or ability/willingness to pay more would not result in consumers being treated fairly[65].

61 See the example of Flood Re in the UK, a new organisation that aims to lower the cost of insurance for people who live in areas prone to flooding.
62 See also the FSUG Paper on Assessment of current and future impact of Big Data on Financial Services, June 2016, which mentions, amongst other risks, the risk of exclusion from certain financial services.
63 Concerns about personalized pricing and in particular the transparency around such practices have been noted for instance in the European Parliament Report New Trends and Key Challenges in the Area of Consumer Protection or the Report from Office of Fair Trading, Personalised Pricing: Increasing Transparency to Improve Trust in the Market, May 2013.
64 Certain national financial regulations may establish specific requirements regarding the processing of certain types of personal data, for example regarding the use of customers' genetic information and information about the customers' heredity when entering into an insurance contract. For example, the Danish Insurance Contracts Act does not allow such practices; the UK government signed a Memorandum of Understanding with the Association of British Insurers to prevent the industry from using predictive genetic test results.
65 See UK FCA Feedback Statement – Call for Inputs on Big Data in Retail General Insurance (September 2016).

41. Segmentation based on datasets missing information about certain categories of consumers or on algorithms whereby potential consumers are statistical outliers from the expected behavioural norm could also lead to certain groups being disadvantaged in terms of access to products, ignored or neglected (for instance populations that are not tech savvy while institutions use mainly data from various connected devices, sensors, online media etc.[66]). As Big Data processes would allow profiling consumers into different clusters based on their personal characteristics, preferences, etc., certain consumers could be left out of these clusters, for example if they refuse to share their personal information with financial institutions[67]. This may result in such consumers not being offered certain products/services or being offered products not suited to them[68]. In addition, consumers' access to certain financial services, and in particular their ability to switch providers, may be impaired if consumers' data is not transferrable[69].

Risks related to reduced comparability of financial services

42. One of the key objectives of recent legislative developments in the area of financial services and products (e.g. PRIIPS, MiFID, IDD, PSD2, MCD) is promoting the comparability of financial products/services to improve the capabilities of the consumer to make informed decisions. This could be undermined by the increasing personalisation that Big Data makes feasible; increasingly personalised methods to disclose information[70] or personalised products[71] could also reduce the comparability, making it increasingly harder for consumers to compare one offer with another, which could have an impact on market competition.

Risks linked to limited/unclear information and comprehension about the extent to which the offer/service is tailored to consumers and/or represents a personal recommendation

66 Certain consumers, in particular older generations, that are not tech-savvy and have no access to automated tools, connected devices, telematics boxes, etc. might risk being excluded from certain services simply because the algorithms would not have the standard type of data to analyse. According to the Eurobarometer, 46% of people aged 55 or over say they are concerned about the recording of their everyday activities via mobile phone use or mobile applications, compared with 60-63% of younger respondents; younger generations (millennials) are generally more open to share data compared to older generations.

67 71% of Europeans feel that there is no alternative other than to disclose personal information if they want to obtain products or services according to the Special Eurobarometer 431 - Data protection, June 2015.

68 Financial institutions should however comply with relevant sectoral requirements to assess certain minimum information about clients before providing certain types of services as well as with product governance requirements.

69 However, the GDPR will address certain current portability issues. Consumers could transfer telematics motor data from one insurance undertaking to another. They could do the same with records on their previous investments and profiles.

70 See the FSUG Paper on Assessment of current and future impact of Big Data on Financial Services, June 2016, referring to how Big Data applications may serve the purpose of displaying more personalised information which takes into account consumer's investment habits, knowledge. The FSUG Paper noted that while this use of Big Data may improve consumer's understanding of information, it may also create new risks in terms of transparency or the way algorithms filter/tailor information.

71 In the insurance sector the development of behavior-based policies such as the ones using telematics in motor insurance allow to tailor-made insurance policies to the driving skills and characteristics of the consumer; consumers are offered different products and premiums depending on the record mileage, frequency of accelerations and hard brakes, average speed etc.; policies between consumers with different driving habits may therefore be less comparable.

43. Targeted offers or services based on granular segmentation or analysis of personal data may be perceived as being personalised to the needs and objectives of the client. This could raise questions in terms of consumers' perception as well as classification/ nature of the service provided and corresponding regulatory protections. In particular, such targeted marketing/personalised offers can be perceived by consumers as advice while this may not be the case from the firm's point of view[72].

Risks for consumers derived from more aggressive marketing or cross-selling practices

44. Financial institutions may use Big Data to monitor and predict consumer sentiment towards certain products and institutions and to understand consumers' preferences, with a view to offer targeted discounts or additional services. Targeted offers and advertisements could be seen as aggressive or lead to investment decisions which may not be always in the interest of consumers. This could be the case, for instance, on discounts offered to consumers who are about to switch or shop around. Financial institutions, especially those acting in multiple sectors, could exploit the data gathered across different sector/ business lines to promote/push for the cross-selling of several products. While cross-selling practices may provide benefits to consumers (for instance in the form of targeted discounts and tailor-made packages), they can also represent practices where customer interests are not adequately considered, for example if consumers were sold a product/service without really needing or fully understanding the implications, due to poor disclosure and selling practices, contrary to EU regulatory requirements[73].

45. While financial institutions could also deliver offers from specific trading partners based on their purchase history and spending data, consumers may be (unpleasantly) confronted with an unexpected amount of advertising where their data is shared with/sold to other (not necessarily financial) institutions who use the data for their own purposes [74].

Potential benefits and risks linked to the quality of processes and services using Big Data tools

Potential benefits for consumers and financial institutions linked to better/innovative processes, products and services

72 This would raise the risk of non-compliance with regulatory requirements applicable to the provision of advice. Under MiFID, the presentation of a recommendation is important in determining whether investment advice is being given: one of the tests that the Directive sets out is whether a recommendation is presented as suitable, rather than whether it is actually suitable for the client. If a recommendation is put forward in such a way that a reasonable observer would view it as being based on a consideration of a client's circumstances or presented as suitable then – subject to some other conditions – this will amount to investment advice. Under Art 24(4) MiFID2 and Art 18 IDD, investment firms and respectively insurance undertakings and intermediaries must inform the clients in good time before the providing advice/the conclusion of the contract whether it provides advice.

73 See Art. 24(11) MiFID II, ESMA Guidelines on cross-selling practices, Art 24 IDD, Art 12 MCD, Art 8 PAD; see also Art. 16 PAD.

74 These practices should in any event be considered against some of the more general data protection and consumer protection requirements mentioned above.

46. Big Data may lead to better and more informed decisions, more efficient processes and more appropriate services. Financial institutions may better analyse the financial markets and support investment decisions in the financial markets. Furthermore, Big Data could be used to instantly share information across the financial institution or to all relevant actors involved in carrying out a certain business action. It has the potential to enhance transparency within institutions, providing decision-makers with a better overview and thus promoting more efficient practices.

47. Using Big Data analytics could also optimise the supply monitoring, improved tracking of products' performance and clients' satisfaction. Services based on Big Data may increase the level of interaction between firms and consumers and could increase consumers' engagement in the design of better products/services[75]. The consumer experience may be improved as consumers could more easily interact with their financial services providers[76] which in turn could more promptly adapt their products and services to consumer feedback. The proliferation of mobile phone applications and other internet-based communications channels facilitate the collection of feedback from consumers in real-time. Existing products and services could be refined and amended at an early stage or the need for new products and services could be recognised quickly.

48. Big Data may enable financial institutions to improve the development of new or higher quality products and services. Financial institutions could for instance be able to efficiently implement product governance processes[77], to define appropriate target markets and ensure specific financial instruments reach those clients whose needs, characteristics and objectives truly correspond to the purposes and features of the product. The identification of consumer sub-groups could allow clients' needs to be more precisely met, including when products and services are provided through non-advised sales. Furthermore, Big Data tools could enable manufacturers and distributors to monitor whether products perform as intended, whether products reach the intended target clients or whether they should review product features or their distribution strategy.

49. Big Data could also facilitate for instance the provision of advice or the performance of suitability/appropriateness or demands & needs tests, by enabling a better matching between clients' profiles and products launched. Financial institutions would better anticipate consumers' needs or interests by offering products that are more adapted to them[78]. Consumers could obtain products and services based on the most up-to-date market information and as

75 Big Data, Time for a lean approach in financial services, Deloitte.

76 For example, telematics devices installed on motor vehicles may provide an accurate account of the events in case of an accident (e.g. via the submission of geo-location information of the vehicles involved in the accident), allowing insurance undertakings to reduce claims processing times.

77 See MiFID II (Art 16 and 24), IDD (Art 25) explicitly require financial institutions to develop products adapted to the needs of an identified target market of end-consumers; see also EBA Guidelines on product oversight and governance or the 2013 Joint Position of the European Supervisory Authorities on Manufacturers' Product Oversight & Governance Processes.

78 The EBA Discussion Paper on innovative uses of consumer data gave the example of a financial institution proactively sending an email advertising a children savings account to a recent parent.

complete as possible information on their expectations/profile[79]. Financial institutions could ensure that their advice or portfolio management services remain suitable over time, taking into consideration changes in market circumstances or consumers' situation[80] without significant additional costs[81].

Potential benefits for consumers derived from better insight into and control over their financial situation

50. The use of Big Data tools may allow consumers to gain better insight into their spending behaviours, financial situation and needs and facilitate personal financial management[82]. Applications based on Big Data tools (which assess a customer's financial profile and spending habits) may deliver real-time guidance to help consumers make more informed decisions about their money and investments and help them act upon financial matters.

Potential benefits for consumers and financial institutions linked to improved detection of fraud and other illegal activities

51. Financial institutions may use Big Data analytics to identify potential for illegal trading activities and detect fraud or market abuse. Using a multitude of data relevant to credit card fraud and customers' transactions, firms may identify transactions that have a high likelihood of being fraudulent at an earlier stage and therefore prevent detriment for consumers[83]. The use of Big Data processes could enable financial institutions to go through any existing claims and fraud databases and combine it with other external databases (such as various data from tax authorities, credit card information, spending patterns, activity in the internet and social media, geo-location information etc.) to more efficiently detect possible cases of fraud and therefore decrease the losses they would have otherwise incurred.

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79 This is consistent with Article 20 IDD, requiring that any insurance contract proposed to the customer is consistent with his insurance demands and needs. Also, MiFID foresees for specific suitability and appropriateness tests in order to ensure clients are provided with suitable products or have the knowledge and competence to assess whether the envisaged investment is appropriate (Art 19 MiFID I – Art 25 MiFID II).

80 For instance, insurance undertakings, which are aware of the customer´s location and situation (e.g. ski trip or beach holidays) could offer on-time accident or property insurance coverage.

81 For example, investment strategies based on Big Data analytics can incorporate market changes continuously, to provide real-time, personalised services and feedback to consumers, reflecting relevant market developments and thus more tailored to consumers' needs - Artificial Intelligence (AI) technology started to being applied by certain asset managers, with advanced machine learning turning big data into algorithmic trades and strategies, Digitizing Intelligence: AI, Robots and the Future of Finance, 3 March 2016. KPMG AIMA MFA Global Hedge Fund Survey (Transformative change - How innovation and technology are shaping an industry, 2016) indicate that a significant number of hedge fund managers (58% of those interviewed) consider that artificial intelligence/machine learning will have a "medium to high" impact on the sector over the next five years; 32% of managers reported they are already using predictive analytics to uncover new trends and identify new opportunities.

82 Such as "smart wallet" services which can warn consumers against over spending. However, one consumer association (BEUC) was also concerned that budget-warning apps could encourage spending up to the point of an alert, see QED Debate on Consumer Data in Financial Services, Brussels, 13 October 2016.

83 Putting Big Data to Work for Financial Services Companies, http://www.banktech.com/data-and-analytics/putting-big-data-to-work-for-financial-services-companies/d/d-id/1296309?. See also Art 94 PSD2 which states that Member States shall permit processing of personal data by payment systems and payment service providers when necessary to safeguard the prevention, investigation and detection of payment fraud.

52. Moreover, financial institutions could use the information gained through social media and online search functions to discover "phishing" activities or other illegal utilisation of the name, trademark and slogan of their firm. Big Data technologies could help uncover these fraudulent activities much earlier than conventional methods.

Potential benefits for financial institutions relating to improved regulatory compliance ("regtech")

53. New regulatory and compliance requirements are placing greater emphasis on governance and risk reporting, driving the need for deeper and more transparent analyses across organisations, especially global entities. Big Data technologies may address regulatory and compliance requirements and costs more efficiently[84]. In particular, they can help with compliance by mining the data related to firms' activities and setting up intelligent queries and algorithms to detect red flags. As automated tools can generate an automatic record of the information that has been captured, the algorithm used, the decisions made and the output provided, it may also be easier for financial institutions to maintain records for regulators or in case of consumer complaints.

Risks related to consumers having limited ability to correct information errors, challenge the use of data/ decision-making processes or seek clarifications

54. The provision of Big Data-based products and services may raise concerns as to the lack of transparency around the processing of data and the firms' decision-making using various underlying algorithm or decision tree mechanisms. The information asymmetries could grow larger and customers might be "subject to decisions that they do not understand and have no control over"[85].

55. The opacity around the provision of services using Big Data could make it difficult to challenge the criteria used in the development of algorithms, the poor quality, the accuracy[86] or the relevance of data used by firms' analytics algorithms , in particular, where decisions are made on the basis of what data indicate customers' probable actions/behaviour may be or on data focusing on certain features about the consumer while disregarding others. Accordingly, the consumers' right to ask for the removal of inaccurate, inadequate or excessive information for the purposes of data processing may also be rendered more difficult with the risk of consumers

84 For instance, by using Big Data tools firms can monitor data and flag subtle signs of suspicious behavior in transactions unnoticeable in numbers, only in text; cf. the Institute for international Finance, Digitizing Intelligence: AI, Robots and the Future of Finance, 3 March 2016.

85 WP29 Opinion 3/2013 on purpose limitation. However, data controllers must adopt suitable safeguards, such as giving you the opportunity to discuss the thinking behind the processing of the data or to contest decisions based on inaccurate data, http://ec.europa.eu/justice/data-protection/individuals/rights/index_en.htm. See Article 18 (Obligation to assess the creditworthiness of the consumer) MCD states that Member States shall ensure that where the credit application is rejected, the creditor informs the consumer without delay of the rejection and, where applicable, that the decision is based on automated processing of data.

86 As data is collected from various sources and may be difficult to verify its accuracy. Veracity is the 4th V that is more and more associated with the use of Big Data. However, financial institutions should bear in mind various regulatory provisions around the need to ensure that data is accurate and up to date (see MiFID rules on suitability assessments; MCD provisions on creditworthiness assessments requiring information should be appropriately verified, including through reference to independently verifiable documentation when necessary).

being refused certain services or contractual conditions or on the contrary being offered certain services that are unsuitable or unnecessary.

56. Moreover, consumers may be unaware that the personal data is used in ways they did not envisage when they initially provided it. This is potentially problematic given that consumer awareness of the use of Big Data and of consumer data protection rights appears to be low. While data protection requirements should provide key safeguards, consumers (in particular internet-minded) may not fully understand the consequences of opting-in to use of their personal data, or may not pay the necessary attention to the terms and conditions concerning the use of the data by financial institutions or other third parties to which data could be sold, especially when the relevant clauses are opting-out ones.

57. Consumers may also face difficulties in understanding essential information about the products and services provided to them or about the assumptions and limitations of the criteria and methodology used by Big Data analytics. This raises questions around the accuracy and transparency of algorithms, and to what extent regulators have oversight of the use of algorithms. Consumers might not have the possibility or the incentive to ask questions on key terms and conditions and challenge the targeted offer or the terms and conditions of the service provided to them. This may increase the risk of financial institutions taking advantage of the behavioural biases and limitations of consumers [87]. Consumers may therefore make inappropriate investment choices or be directed to firms' products only or towards services that bring certain benefits to the firm[88]. This risk may be magnified by the fact that consumers might perceive the automated provision of services as easy to use and therefore might not grant the appropriate time to duly consider the information or offer.

Risks for consumers and financial institutions related to flaws in the functioning of Big Data tools

58. In a Big Data environment, there is a potential for incorporating errors and biases at almost every stage, from the choice of datasets to process, of the algorithm or decision tree logic, etc. Big Data tools relying on certain flawed algorithms or market assumptions (e.g. that interest rates will always be low) could lead to an output not being adequate to the consumer's situation. This could prove even more detrimental where neither consumers nor financial institutions

87 Behavioural science shows that consumers are susceptible to 'nudges'. Nudges can be used by financial institutions in a positive way (stimulating sensible consumer choices and behaviour) or in a self-serving way (enticing consumers to make unwise choices that financially benefit the financial institution). Big data may likely greatly increase the capability of financial institutions to use nudges that benefit themselves, but are detrimental to consumers.

88 However, MiFID/IDD sets out a number of relevant provisions including in relation to the management of conflicts of interest and the disclosure of information to clients (on products, services, the institution, risks and benefits, etc) that must be fair, clear and not misleading. Also, MCD require creditors and, where applicable, credit intermediaries or appointed representatives to provide adequate explanations to the consumer on the proposed credit agreements and any ancillary services, in order to place the consumer in a position enabling him to assess whether the proposed credit agreements and ancillary services are adapted to his needs and financial situation.

doubt or are able to identify that a mismatch exists between the final output/service and consumers' needs[89].

59. If there are errors in the quality[90] or veracity[91] of the data collected or operational or other weaknesses/biases in the algorithms and systems used to support the provision of services or decision-making processes, this may lead to the creation of inappropriate products and services and therefore to losses. Such weaknesses and risks that data may be flawed or manipulated at the source may be magnified in case of concentration and centralisation of data providers or storage or analytics providers[92]. Any flaws could then lead to detriment for consumers and could lead to reputational and litigation costs for financial institutions. This risk would be accentuated in case of widespread use of Big Data, in particular where business models are based on similar (or identical) flawed underlying datasets and algorithms. The risk would therefore be that a significant number of consumers would end up transacting in the same way in relation to the same financial products/services, thus giving rise to a high number of complaints/losses[93].

60. Traditional information systems may not be adapted to Big Data technologies and the required investments to adapt them to the new state of the art may not be a seamless process. Moreover, financial institutions' collaboration with external tech companies, with different business models and regulatory cultures, could entail certain risks. Furthermore, analytical models will require adjustments to incorporate new data from evolving technologies, making data quality and governance frameworks key to avoid errors. Data quality checks should also cover external data; the reliability on and quality of external data will also be a very important element at stake.[94]

Potential impact on revenues/costs

Potential benefits relating to increased revenues/lower costs derived from cost-effective processes, products or services

61. The use of Big Data could bring down firms' operational costs such as manufacturing, marketing or claims/complaints management costs[95]; it could optimise firms' decision-making and distribution processes; it could lead to lower costs of customer onboarding (especially tech-

89 See FSUG, Assessment of current and future impact of Big Data on Financial Services, June 2016, mentioned above.
90 The efficiency of Big Data solutions may be impacted by the variability and complexity of the data processed (e.g. ambiguities, emotions, etc.).
91 As mentioned above, veracity is the 4th V suggested by some commentators.
92 Financial institutions should always observe various requirements such as having robust governance arrangements, well-defined organisational structures, transparent and consistent lines of responsibility, effective processes to identify, manage, monitor and report the risks they are or might be exposed to, adequate internal control mechanisms, including sound administration and accounting procedures, and remuneration policies and practices that are consistent with and promote sound and effective risk management and the interests of clients.
93 The newly introduced product intervention powers (MiFIR/PRIIPs) could become relevant in case of such widespread risks to consumers and potentially detrimental to the stability of a financial sector.
94 Big Data & Analytics; the algorithm of modern business, CRO Forum, 2015.
95 Big Data technologies could facilitate claims processing automation and in doing so enable a more uniform treatment for various claims/complaints and reduce the time it takes to process a claim/complaint.

savvy clientele) or product development. By better understanding and reacting to clients' needs, firms can limit losses due to inefficient or unwanted products or services.

62. Financial institutions may consider that providing products/services based on Big Data tools may be more cost-efficient due to the lower/limited need to employ human advisers or data analysts[96], or because lower costs are incurred from potential human error. Big Data technologies may reduce the time staff spend analysing, interpreting, applying or explaining data[97]. Financial institutions using cognitive agents/virtual banking specialists could reduce operational costs as the need for employees performing similar tasks gradually vanishes[98].

63. Although a period of initial investment and other ongoing resources are required (as explained in the following section), once the cost of system development has been met, financial institutions may benefit from economies of scale via a potential wider client base as mentioned above. Moreover, although certain data might become out-dated, other datasets could often be used and reused[99], providing opportunities for firms to develop new services or business models. In competitive markets, these costs reductions could, to a certain extent, be passed on to customers and could decrease the costs of products and services for them.

Budget and human capital challenges

64. Errors/inadequacies of the Big Data tools could be more likely to arise if tools are developed without the input of qualified staff, with sufficient understanding of the implications of the Big Data tools and products/services[100], contrary to certain EU requirements[101]. New skills, in particular data scientists or behavioural and social specialists, will be required, leading to the creation of new multidisciplinary teams with employees of different backgrounds. Financial institutions may face important challenges related to such budget and human capital limitations (notably the need to train staff and develop specialised expertise to be able to design algorithms, handle, analyse and monitor any decision-making process based on Big Data analytics). They should ensure that not only their IT systems and storage facilities have appropriate security measures (particularly regarding cyber-security risks) and validation systems (i.e. data quality checks) in place, but should also ensure relevant persons (managers, compliance officers, sales

96 The DP on automated advice noted for instance that the cost of advice based on automated processing of data, including data from external sources, could be lower than human advice.

97 AI software has made significant strides towards generating reports for instance which could be used to reduce significant resources financial institutions use to report on client investment strategies or portfolio performances for instance; cf Digitizing Intelligence report mentioned above.

98 Digitizing intelligence: AI, Robots and the Future of Finance, March 3, 2016.

99 As far as the use of personal data remains compliant with data protection purpose limitation requirements.

100 For example, if tools are developed by technology or programming specialists without the involvement of financial specialists or the other way around.

101 Art 74 CRD IV states that institutions shall have robust governance arrangements, which include a clear organisational structure with well-defined, transparent and consistent lines of responsibility, effective processes to identify, manage, monitor and report the risks they are or might be exposed to, adequate internal control mechanisms, including sound administration and accounting procedures, and remuneration policies and practices that are consistent with and promote sound and effective risk management. Article 41 Solvency II requires all insurance and reinsurance undertakings to have in place an effective system of governance which provides for sound and prudent management of the business. See also Art 13 MiFID I (future 16 MiFID II), Art 5 MiFID 1 Implementing Directive.

staff, advisers, etc) are able to understand the implications of using Big Data, identify and correct biases or deficiencies. Firms may also face higher costs regarding the collection of data[102] or the establishment and maintenance of data centres to prevent IT-system breakdown or to recover from them (Disaster Recovery plan, data mirroring). These challenges may act as a barrier or be overwhelming for certain financial institutions and could lead them to exit a specific market.

Potential lower costs related to enhanced risk and credit-worthiness assessments

65. Financial institutions are ramping up their risk management initiatives to help improve enterprise transparency, auditability and oversight of risk. They may be in a better position to estimate and manage risks [103] through the implementation of enhanced algorithmic risk assessments. The use of Big Data to perform credit worthiness assessments and predict default risks could have positive implications for the financial soundness of financial institutions.

Potential increased revenues from access to a wider/more stable client base

66. The new generation of smart objects/Internet of Things enable firms to interact with consumers as never before. Data and analytics enable firms to listen, learn and engage better with consumers. By using Big Data tools financial institutions may identify new customers and therefore new revenue sources. Moreover, firms can avoid customer attrition and predict probability of churn. The use of Big Data may also increase financial institutions' sales, because consumers would feel more prone to purchasing products and services that are tailored to their needs and habits. Asset managers, for instance, are increasingly using data analytics solutions at every stage of the customer relationship to increase client retention. By incorporating broader and multi-source data sets, they are forming a more holistic view of customers to better anticipate and satisfy their needs and therefore bring in loyalty[104].

Potential increase of revenues linked to exploitation of data

67. Firms can also increase their revenues by exploiting the data they own (for instance the internal data on customers by selling it to other interested parties or by being remunerated by a third party to relay their advertisements or offers to specific consumers) [105].

Potential impact on claims settlement/complaints handling practices

68. In the event of a claim or complaints about the services/products offered by a financial institution, Big Data could potentially be used by insurance distributors or more generally financial institutions to "optimise" claims settlement offers/complaints handling based on the statistical likelihood (i.e. predictability) that the consumer will accept the offer/response, rather

102 In particular, if firms invest in irrelevant, out of date or erroneous data. Unnecessary costs might arise also from the use of Big Data technologies that are not well aligned to the needs of the business process or services to be provided.
103 Given for instance prudential requirements with a focus on market liquidity risk, stress testing and capital adequacy.
104 PWC Global Fintech Report, March 2016, quoted above.
105 Of course firms should bear in mind any data protection requirements when exploiting data owned as well as reputational risks to which they may subject themselves in doing so.

than on the fair value of the claim itself. Such predictions could be done using the claims/complaints history of the customer or analysing his social media publications[106]. This could be against the overarching obligation of financial institutions to always act honestly, fairly and professionally in accordance with the best interests of their customers and the transparent and prompt handling of complaints[107].

Reputational, legal and cybersecurity issues related to the use of Big Data technologies

Potential reputational or legal risks linked to the use of Big Data technologies

69. Reputational risks and issues around customer confidence in the use of personal information[108] could also emerge if financial institutions do not develop suitable controls (validation, storage, security) around Big Data technologies or carry out the monitoring to an extent regarded as invasive or a breach of privacy. In general, failing to observe data protection requirements can lead to supervisory sanctions/fines as well as expensive lawsuits and damage consumer confidence. Financial institutions should therefore be paying attention to employing and training staff not only in relation to relevant financial requirements but also in the field of IT and data protection[109]. Moreover, these risks would also impact financial institutions' revenues in a negative way (as mentioned in the previous Section).

Amplified cybersecurity risks

70. While financial institutions should have appropriate systems and control mechanisms to manage such cybersecurity risks[110], risks may nevertheless materialise due to cyber-attacks leading to losses or misuse of data, in particular personal data. Consumer detriment may arise even where firms may have aggregated and anonymised data but fraudulent third parties may still be able to identify consumers. Furthermore, the risk of detriment may be magnified as it may take longer for financial institutions to identify instances where data was misused or cyber threats have occurred because of the limited or lack of human intervention in Big Data related processes.

106 In insurance Big Data could lower rates for optimistic tweeters, Reuters, 23 October, http://www.reuters.com/article/us-insurers-bigdata-consumers-idUSKCN12N05R

107 See MiFID Art 13 (future art 16 MiFID II, and corresponding level 2 measures on complaints handling) or IDD Art 19, which covers also claims settlement practices per Article 2 (1) (1) IDD; ESMA/EBA Guidelines for complaints-handling.

108 Nine out of ten Europeans have expressed concern about mobile apps collecting their data without their consent, and seven out of ten worry about the potential use that companies may make of the information disclosed. And a majority of respondents say they are concerned about the recording of their behaviour via payment cards - Source: http://europa.eu/rapid/press-release_MEMO-15-6385_en.htm, Special Eurobarometer on Data Protection, July 2015.

109 See for instance Art 5 MiFID Implementing Directive 2006/73/EC requirements.

110 See Art 95 (Management of operational and security risks) PSD2 states that Member States shall ensure that payment service providers establish a framework with appropriate mitigation measures and control mechanisms to manage the operational and security risks, relating to the payment services they provide. As part of that framework, payment service providers shall establish and maintain effective incident management procedures, including for the detection and classification of major operational and security incidents; Article 74 CRD IV; Art 16(5) MiFID2.

Risks related to liability allocation

71. Several actors may be involved in the data collection, aggregation, storage, analysis or usage and problems and errors may emerge at each stage. Where there are no appropriate controls in place over any outsourcing arrangements[111], financial institutions might be at risk of violating their regulatory and contractual responsibilities towards consumers. Furthermore, if the allocation of liability among all parties involved is unclear, either between the parties, or to the clients, legal disputes may arise between financial institutions and their clients, or between financial institutions and outsource providers. This could confuse consumers and make it difficult for them to understand to which entity they can direct queries or complaints or which entity is liable, depending on the problem (e.g. tool malfunction; inappropriate service; data security breach; etc.) or even lead to consumer detriment[112].

Benefits and risks linked to the impact on consumers' lifestyles and broader ethical considerations linked to the use of Big Data

72. Big Data may have an impact on people's personal lives and environment. As consumers become aware that data on their behaviour and consumption profile may be used, their lifestyle could be impacted as they would receive incentives (monetary or of a different nature) to avoid unhealthy habits, exercise more, or drive more cautiously. Also, in home insurance, "smart", connected, homes with sensors or devices to detect risks, such as fire, could benefit consumers.

73. While such impact on consumers' lifestyle could be seen by some as positive, it could also lead to conformist behaviour. Referring to the insurance and banking sectors, the EDPS Opinion mentioned the risk of penalising any deviations from what is deemed as the statistical/expected norm: the need for a loan or insurance could push or coerce individuals into avoiding certain behaviours or contact with certain people or companies, or from visiting certain areas. As such the use of Big Data could be perceived as a very intrusive tool and raise broader ethical questions concerning its place in society[113].

Questions:

8. Do you consider the potential benefits for consumers and respectively financial institutions to be accurately described? Have you observed any of them in practice? If so, please provide examples. If not, please explain whether you are aware of any barriers that may prevent the above potential benefits from materialising?

111 Contrary to regulatory requirements on outsourcing as set out for instance in Art 16(5) MiFID2, Art 13 UCITS Directive, Art 49 Solvency II, Article 20 (Liability) of PSD2.

112See however Art 75 MiFID 2 or Art 39 MCD on extra-judicial mechanisms for consumer complaints; Art 26 EC MiFID 2 Delegated Regulation on complaints handling (current Art 10 MiFID 1 Implementing Directive); EBA & ESMA joint guidelines on complaints-handling; Article 101 (Dispute Resolution) PSD2.

113 These concerns were also mentioned by FSUG in their report on Assessment of current and future impact of Big Data on Financial Services, June 2016.

9. Do you agree with the description of the risks identified for consumers and respectively financial institutions? Have you observed any of these risks (including other risks that you are aware of) causing detriment to consumers and respectively financial institutions? If so, in what way? If not, please explain why. Please also mention whether certain risks for consumers and financial institutions have not manifested yet but have the potential of developing in the future and hence need to be closely monitored by Supervisory Authorities.

10. Is the regulatory framework adequately addressing the risks mentioned above? Bearing in mind the constant evolution of technologies/IT developments and that some of the above mentioned regulatory requirements are not specific to the financial services sector (e.g. GDPR), do you think further regulation is needed to preserve the rights of consumers of financial services in a Big Data context? Please explain why.

11. Do you agree that Big Data will have implications on the availability and affordability of financial products and services for some consumers? How could regulatory/supervisory authorities assist those consumers having difficulties to access financial services products?

12. Do you believe that Big Data processes may enable financial institutions to predict more accurately (and act accordingly) the behavior of consumers (e.g. predicting which consumers are more likely to shop around, or to lodge a complaint or to accept claims settlement offers) and could therefore compromise the overarching obligations of financial institutions to treat their customers in a fair manner? Please explain your response.

13. Do you agree that Big Data increases the exposure of financial institutions to cyber risks? If yes, what type of measures has your institution adopted or is going to adopt to prevent such risks? What could supervisory/regulatory authorities do in this area?

14. Would you see merit in prohibiting the use of Big Data for certain types of financial products and or services, or certain types of customers, or in any other circumstances?

15. Do you agree that Big Data may reduce the capacity of consumers to compare between financial products/services? Please explain your response.

16. How do you believe that Big Data could impact the provision of advice to consumers of financial products? Please explain your response.

17. How do you believe Big Data tools will impact the implementation of product governance requirements? Please explain your response.

18. How do you believe Big Data tools will impact know-your-customer processes? Please explain your response.

Possible evolution of the market

74. In so far the economy becomes more and more digitalised, the availability of data is likely to exponentially increase in the future. Indeed, technical developments such as intelligent cars, wearable devices and connected houses are still in their infancy. As they gradually develop over time, data is expected to increasingly become a key feature for the business processes of financial institutions, and hence the value of data and its competitive relevance will increase.

75. Financial institutions' growing interest in the use of Big Data may also be partially attributable to the potential threat posed by (non-financial) technology companies which have considerable amounts of data that offer valuable insights into their users. It is entirely plausible that tech firms would expand into broader financial services, leveraging their own technical expertise, innovative and integrated platforms, extensive consumer data or loyalty among millennials and digital natives. Many financial incumbents understand this reality and are well aware that Big Data related technologies are a potential threat as well as an opportunity for their sector[114].

76. Big Data technologies may also change the way financial services are provided. They could increase the quality of services/consumer protection standards beyond the current legal requirements. This could in turn raise questions about the current classifications and differences in applicable rules depending of the type of service provided, with or without detailed assessments (such as under suitability or demands & needs tests).

77. The adoption of Big Data technologies by financial institutions raises new regulatory, security, privacy, accountability and social concerns[115]. As noted above, without appropriate safeguards, consumers' data may be misused or hacked with potentially devastating consequences. This could result in an increased demand for cybersecurity (re) insurance, particularly by SMEs and other private institutions. The encryption of data could also become increasingly important as a result of cybersecurity threats.

78. Moreover, questions surrounding who will have access and control the growing consumer data sets that Big Data tools will be able to extract from their interactions with clients will need to be addressed. Other important considerations for regulators include how to supervise institutions that develop and operate Big Data software, how to determine if a Big Data-based service failed or provided inappropriate services or whether business decisions are discriminating against certain group of customers.

79. Another development which could potentially have a great impact in the markets is the development of public and private data bases, whether in the form of more precise flood maps, or in the form of blockchain technology, which essentially represents a shared, distributed

114 Digitizing Intelligence: AI, Robots and the Future of Finance, 3 March 2016.

115 While not being the focus of this Discussion Paper, Big Data will undoubtedly intensify social concerns as these technologies may threaten number of current occupations across financial services (and beyond) industries. Ethical and "Big Brother" concerns are mentioned by many observers and renowned thinkers.

database of transactions among parties. In addition to a greater availability of data, the capabilities for processing and analysing data are also in constant evolution. Artificial intelligence / machine learning technologies are expected to multiply the capabilities of financial institutions to collect and analyse data, for instance through software-customer interactions. Cognitive computers may also enable financial institutions examine and extract valuable information from large amounts of structured and unstructured data.

Questions:

19. What are key success factors for a Big Data strategy (i.e. the adaptation of the business model/plan towards Big data driven technologies and methods)?

20. What are the greatest future challenges in the development and implementation of Big Data strategies?

21. This Discussion paper refers to a number of measures and tools meant to ensure compliance with conduct and organisational regulatory requirements as well as data and consumer protection rules in the context of big data analytics. Are other measures and tools needed? If so, what are they and what they should cover?

22. How do you see the development of artificial intelligence or blockchain technology in connection with Big Data processes?

Additional comments:

23. Are there any other comments you would like to convey on the topic of use of Big Data by financial institutions? In particular, are there other relevant issues that are not covered by this Discussion Paper?