Joint Discussion Paper: Use of Big Data by Financial Institutions

IFoA response to European Supervisory Authority

17 March 2017

About the Institute and Faculty of Actuaries

The Institute and Faculty of Actuaries is the chartered professional body for actuaries in the United Kingdom. A rigorous examination system is supported by a programme of continuous professional development and a professional code of conduct supports high standards, reflecting the significant role of the Profession in society.

Actuaries' training is founded on mathematical and statistical techniques used in insurance, pension fund management and investment and then builds the management skills associated with the application of these techniques. The training includes the derivation and application of 'mortality tables' used to assess probabilities of death or survival. It also includes the financial mathematics of interest and risk associated with different investment vehicles – from simple deposits through to complex stock market derivatives.

Actuaries provide commercial, financial and prudential advice on the management of a business' assets and liabilities, especially where long term management and planning are critical to the success of any business venture. A majority of actuaries work for insurance companies or pension funds – either as their direct employees or in firms which undertake work on a consultancy basis – but they also advise individuals and offer comment on social and public interest issues. Members of the profession have a statutory role in the supervision of pension funds and life insurance companies as well as a statutory role to provide actuarial opinions for managing agents at Lloyd's.

European Supervisory Authorities 17 March 2017

Dear Sirs,

European Supervisory Authority Joint Discussion Paper: Use of Big Data by Financial Institutions

1. The Institute and Faculty of Actuaries (IFoA) welcomes the opportunity to respond to the European Supervisory Authority's Discussion Paper (DP) on the use of big data by financial institutions.

2. The IFoA's Modelling, Analytics and Insights from Data (MAID) working party and the General Insurance and Health & Care Practice Boards have been involved in the drafting of this response. Members of the working party and Practice Boards have been actively engaged with the development of Big Data techniques in the insurance industry.

3. Big Data has the potential to transform processes for financial institutions (and business in general), for Governments, consumers and wider society. This potential comes from not only gathering ever more data, but also from the growth in data analytic capability, and the ability to see people and processes in much more detail than before. Improved analytics can also identify relationships which would otherwise remain hidden in the data.

4. We have set up our MAID working party to consider the opportunities Big Data offers our members. The working party is structured into four workstreams, considering:

    - research into the Big Data or Data Science 'landscape';
    - new approaches to current actuarial work;
    - potential new opportunities for actuaries; and
    - implications of the emergence of Big Data/ Data Science for the actuarial profession.

5. In the questions that follow, we have focussed on the implications of Big Data for insurance firms. We have also limited our responses to questions where the IFoA is able to offer specific comment.

Q1: **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.**

6. Consistent with the description in ESA's discussion paper, the IFoA also takes a holistic view of Big Data. We agree that Big Data relates not only to the collection and use of data, but also to the subsequent analytical tools, methodology and technology used to benefit from the extra insight offered by the corresponding data sets. This wider view is also reflected in the name of our MAID working party referred to above i.e. modelling, analytics and insights from data.

7. We recognise that recent years have seen not only the exponential growth in data generation/ capture, but also advances in technology. Such advances in technology mean that data can be stored, transformed and analysed much more quickly than in the past.

8. We are familiar with the characterisation of Big Data in terms of the increased volume, variety and velocity of data, or the three 'Vs' as described in the DP. However, we have also seen Big Data further described in relation to both the *veracity* and *value* extracted from data.

9. The DP makes the distinction between structured/ semi-structured/ unstructured data which we agree is relevant - in particular to the increased variety of data sources which can now be processed by technology.

10. The DP refers to data warehouses in terms of specialised processing of consumers' data. However, the Big Data world is evolving such that data warehouse technology may be becoming outdated. New techniques such as 'Hadoop' software are becoming more common in the distributed storage and processing of large datasets.

11. Big Data raises a range of potential public interest concerns for insurers and other financial institutions. Users of Big Data will need to consider ethics and privacy standards, including whether the application of Big Data puts customers' needs first. We cover public interest concerns in more detail in the questions below.

Q2. **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 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.**

12. We believe that Big Data has the potential to promote substantial innovation in the insurance industry, including how products are offered and to whom. Risk management is central to insurance, and to understand the nature of the risks they 'collect', insurers are also gatherers of data. Big data offers insurers a step-change in risk analysis by being able to see risks - such as vehicles, people or property - in much more detail than before. This offers potential benefits at each stage of the insurance product lifecycle.
This is covered in more detail in our response to question 8 below.

13. We agree that financial institutions are likely to make increasing use of Big Data. The total invested in the global financial technology sector rose from under $4bn in 2013 to more than $12bn in 2015 [(1)], as record amounts poured into firms developing technologies that promise to revolutionise the financial sector.

14. The DP refers to applications of Big Data in an insurance context. We note that a number of our members are involved in the development of such applications, including: telematics devices in motor insurance; wearable fitness devices in health and care insurance; and advanced risk management (more granular experience analysis) in life insurance.

15. Many larger, more mature insurers rely on legacy systems and processes, and they may be less nimble to change. This could leave such firms exposed to emerging high-technology

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(1) https://www.ft.com/content/1245ce84-d314-11e4-a792-00144feab7de.

firms with a fresh perspective, which could try to capture market share on a more efficient business model.

Q5. **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?**

We have answered this question in general terms; the IFoA does not offer financial products. However, many of our members work for firms which offer insurance products.

16. Development of Big Data infrastructure will likely require significant investment in technology and resource, including specialists with the required skills and expertise. Economies of scale may favour larger insurance groups over smaller, niche insurers.

17. We agree that lack of access to existing datasets could act as a barrier to new entrants to the insurance market. However, new entrants may not be at a disadvantage where current and real-time data is used in insurance risk management i.e. where a dataset including historic policyholder experience is less important in product pricing.

18. Conversely, where an existing insurer is not able to take full advantage of Big Data, it may be at a disadvantage relative to a competitor that is able to assess risk at a more detailed level. In such circumstances, the insurer may lose market share or end up with a greater proportion of higher risks, if consumers deemed lower risk are attracted to other insurers.

Q6. **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.**

19. Clearly, it is important that financial institutions comply with both relevant data protection legislation and consumer protection regulation. We agree that data captured should be relevant to the purpose for which it is being used.

20. Compliance with existing and impending data protection legislation is highly relevant to the use of Big Data. The General Data Protection Regulation (GDPR) will apply in the UK from 25 May 2018, and we note that the UK Government has confirmed that the UK's decision to leave the EU will not affect the commencement of the GDPR in the UK.

21. The principle of consent to the use of data is key, but users of data will need to be clear on the boundaries of data which have permission to be used. For example, where data is gained from social media activity and used for insurance underwriting or marketing purposes, have policyholders and social media platforms necessarily given their consent to this?

22. Reliability is a further important consideration when using Big Data. It would be counter-productive for insurers or other financial institutions to place great faith in large volumes of detailed policyholder data if its reliability is uncertain. More generally, users of data will need to consider whether data sets are relevant, accurate, appropriate and consistent. Financial institutions using data will therefore need to establish robust data quality processes together with suitable controls, including consideration of whether data processing meets data privacy

London   7th Floor · Holborn Gate · 326-330 High Holborn · London · WC1V 7PP · **Tel:** +44 (0) 20 7632 2100 · **Fax:** +44 (0) 20 7632 2111
Edinburgh Level 2 · Exchange Crescent · 7 Conference Square · Edinburgh · EH3 8RA · **Tel:** +44 (0) 131 240 1300 · **Fax:** +44 (0) 131 240 1313
Oxford   1st Floor · Park Central · 40/41 Park End Street · Oxford · OX1 1JD · **Tel:** +44 (0) 1865 268 200 · **Fax:** +44 (0) 1865 268 211
Beijing   6/F · Tower 2 · Prosper Centre · 5 Guanghua Road · Chaoyang District · Beijing China 100020 · **Tel:** +86 (10) 8573 1000 · **Fax:** +86 (10) 8573 1100
Hong Kong 2202 Tower Two · Lippo Centre · 89 Queensway · Hong Kong · **Tel:** +11 (0) 852 2147 9418 · **Fax:** +11 (0) 852 2147 2497

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regulation. Data consistency is a particular issue where a range of different data sources are combined.

23. Big data also raises potential conduct risk concerns for insurers and other financial institutions. We believe that it is in the public interest for financial institutions to consider whether product design and pricing, and wider applications of Big Data, are putting customers' needs first. Failure to do so could risk regulatory intervention to address conflicts of interest, or to improve customer outcomes.

Q8.   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?

24. We recognise the benefits (and risks) set out in the comprehensive description in the DP. With respect to insurance firms, Big Data offers potential benefits to both consumers and the firms themselves at each stage of the insurance product lifecycle, in terms of better:

- customer targeting;
- risk assessment, underwriting and pricing;
- customer relationship during cover, including customer retention;
- financial reporting, internal audit and Management Information; and
- claims management.

Note that customer targeting/ relationship during cover are discussed in our response to question 12.

25. Much of Big Data's potential in the insurance world stems from the greater insight possible in the risk assessment process. It has long been the established practice for insurers to gather data on applicants' (or their property's) characteristics and use this to assess the likely level of risk. From that, an underwriting decision would be made: either to accept the risk on standard terms, to accept on modified terms, or to decline. An appropriate premium based on the risk (and underwriting decision) would then be set. However, Big Data allows insurers to see their applicants' risk profiles in much greater detail and this more granular risk assessment should mean better-informed underwriting, and allow insurers to set premiums in greater alignment with the corresponding level of risk.

26. Insurers could potentially use Big Data techniques to source information they need for underwriting without having to ask the consumer directly. This can reduce significantly the number of direct questions required and hence the effort involved in obtaining an insurance quote.

27. Big Data's real-time nature means that insurance underwriting and premium-setting can become dynamic. Historically, underwriting of most insurance policies took place only at the outset of the policy. Over a long-term life insurance policy however, the corresponding level of mortality or morbidity risk is unlikely to remain constant. Should the level of risk therefore be re-assessed over the lifetime of the policy? Whilst this is possible without using Big Data techniques, Big Data makes this easier.

28. In addition, there is potential to reward policyholders with lower premiums if their risk profile improves, such as via a telematics device in the case of motor insurance, or a wearable fitness device in a health and care context. Furthermore, the prize of lower premiums could encourage policyholders to reduce the 'riskiness' of their lifestyle. By incentivising insurance policyholders in this way, Big Data offers clear benefits to society.
The implications for insurance availability are discussed under question 11.

29. We believe Big Data also has a role to play in making insurance claim management more efficient. Data analytics can be used to prioritise claims, either for quick settlement, or to flag for further analysis by claims assessors. For claims allocated to the former category, the claims process can be streamlined; for the latter, use of the assessor's time can be optimised. Analysis of social media may also indicate whether the claim is likely to be valid, or indicate wider fraudulent activity relating to the policy.

30. Big Data offers the potential for more accurate claims reserving by insurers. A more informed understanding of existing claims is likely to benefit the insurer, their regulator and the consumer: insurers could have a clearer understanding of their financial position.

31. More accurate underwriting (through use of Big Data) could also mean less fraudulent disclosure, with the potential for insurers to reduce the risk that applicants take advantage of information the insurer does not have.

Q9. **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.**

32. We agree that Big Data could have an impact on the degree of pooling of risk in insurance. This risk pooling - where risks are shared between policyholders with broadly similar risk characteristics - is a long established feature of insurance. It is plausible that the rise of Big Data could diminish the extent of pooling, and hence cross-subsidy, between different policyholders. There is already a trend in the UK towards more detailed risk assessment within insurance, such as the emergence in the mid-1990s of impaired life and enhanced annuities, which offer a higher income to smokers or others with chronic/ terminal health conditions. The rise of Big Data could see this trend continue with risk segmentation becoming increasingly fine, with less pooling of risk possible within ever smaller segments.

33. Society may desire a degree of cross-subsidy by retaining pooling of risk where this is deemed to be 'fair'. Across the EU, gender-specific pricing was banned in 2012 on the grounds of sex discrimination. In the UK, the emergence of Flood Re recognises that as flood risk rises, both those at greatest risk and the industry need time to adjust; in this case a temporary subsidy from policyholders with lower risk of their homes flooding to those with a higher risk.
Risks relating to insurance availability are discussed under question 11.

34. We note that there is a potential lack of transparency around the processing of data, including corresponding data analytics. We acknowledge that any information asymmetries could widen with increasing use of Big Data. Reliable insight to the prevailing level of risk requires both robust data quality and a fit-for-purpose analytical model. This requires expert judgement in assessing whether the model is appropriate for the use to which it is put, and whether the resulting outputs make sense. A sceptical and informed view is therefore required to avoid spurious or flawed conclusions being drawn, leading to sub-optimal business decisions. There is a risk of over-reliance on model outputs: no model can replace human knowledge and judgement entirely.

35. Human judgement also brings with it further public interest concerns. As Big Data becomes increasingly intrusive, there a risk of prejudice creeping into any risk profiling applied. Conversely, it could be argued that greater clarity on the risk could reduce the reliance on analysts' prejudices.

36. As insurers (and financial institutions in general) gather increasing volumes of personal data, it is possible that they could be perceived as being overly-intrusive and acting in a 'Big Brother' fashion. Lack of transparency could then diminish the level of trust policyholders place in insurers, and in turn, reduce the scope of data they are happy for the insurer to access. However, where the policyholder can appreciate the tangible benefits of such data collection - such as a reduction in insurance premiums through the use of a telematics device - they may then decide that this outweighs any associated data privacy concerns.

Q11. **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?**

37. We agree that Big Data could impact the cost, availability and suitability of insurance products.

38. The extent of insurance coverage - and the corresponding cost - may be impacted by increasingly detailed risk assessment. If insurers have a clearer understanding of an individual's risk characteristics, then certain market segments may then find that insurance is harder or more expensive to obtain. For example:

- young drivers with little driving experience accessing motor insurance;
- individuals in declining health, finding health insurance becomes too expensive;
- older travellers requiring travel insurance, where current factors used to set insurance premiums are generally broad-brush rather than precise in nature.

The impact on 'non-standard' or unusual risks generally would depend on whether the additional information on underlying characteristics makes the risk more or less attractive to the insurer.

39. Conversely, it is plausible that more detailed risk assessment and segmentation could increase insurance coverage in some cases, such as where a risk would be declined under a broad assessment, but deemed acceptable in the light of greater information. For example, greater clarity on the underlying level of risk could also see younger drivers allocated to lower and higher risk segments, with the former potentially able to access cheaper motor insurance.

Q12. **Do you believe that Big Data processes may enable financial institutions to predict more accurately (and act accordingly) the behaviour 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.**

40. We believe that Big Data can improve insurers' targeting of, and then engagement with, customers during their insurance cover.

41. Insurers can use new sources of data, including data purchased from third parties, to better target intended customers to specific products. They could gain new customers as a result. Analysis of internet search histories or of social media content can help predict consumer preferences and behaviours. In turn, these analyses can be used to match consumers to specific products. Better product match to consumer should then lead to better sales conversion rates. Similar analysis of trends in preferences and behaviours can also improve an insurer's understanding of changes in customer needs, and this insight can be useful in the development of products and design of associated features.

42. Big Data techniques could also lead to improved customer engagement during the course of insurance cover, with the potential to enhance customer retention. Techniques used to predict potential customers' preferences and behaviours from external data can also be applied to the insurer's policyholders, which could be used to improve the targeting of offers, or predict when the policyholders were likely to lapse their policies. The incentive of falling premiums as the policyholder takes action to reduce their associated level of risk could also improve customer retention. Conversely, rising premiums - if out of line with competitors - could have the opposite effect, although that may still be to the insurer's advantage if the premiums charged no longer reflected the true level of risk.

Q13. 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?

43. Cyber risk is an important emerging area of risk, and we agree that Big Data increases financial institutions' exposure to it. In particular, the risks of data being lost, corrupted or stolen are important issues for users of Big Data to consider. Big Data processes will need to be developed with appropriate controls against hacking and other unauthorised users.

Q14. 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?

44. Unless the term 'Big Data' were defined very tightly, we believe it could be very difficult to prohibit its use. However, in general terms, we believe users of Big Data should comply with relevant data and consumer protection regulation/ legislation.

Q19. 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)?

45. A key advantage of Big Data is the insight offered by being able to see people and processes in much more detail than before. From this deeper insight, financial institutions have the potential to make a number of efficiencies or process improvements, such as:

- reduction in costs – making more effective use of scarce resources, by targeting them where and when necessary. For example, in marketing/ underwriting / claims management in an insurance context;
- identification of hidden relationships – analysis of full datasets can show connections which would otherwise remain hidden;
- improved products, services and customer engagement - products and services targeted to consumers' preferences, based on real-time analysis of their search engine/ social media data; and
- identification of new product needs/ market segments - taking analysis of internet usage/ social media a step further to uncover untapped demand.

46. Given this potential, we agree that data availability will become particularly valuable within the financial sector and more widely. The use of Big Data is therefore likely to continue to increase and become more widespread across different financial institutions. This may be due to firms looking to realise the benefits above, or to maintain and protect their competitive position. We also concur that as consumers begin to appreciate the benefits of insurance in a digital environment, it is likely to raise their expectations.

47. Non-financial institutions - with access to suitable data, Big Data expertise, and technology – could plausibly expand into providing financial services - including insurance. This presents a potential threat to incumbent financial institutions, and provides a further incentive for such firms to develop a Big Data strategy.

48. Investing in, or having access to, a suitably skilled workforce and providing appropriate training for those undertaking the work will be key factors for the success of a firm's Big Data strategy. In particular, successful institutions are likely to use or access individuals who have demonstrated the capability to work with, and critically evaluate, datasets, or hire those with the potential to develop these skillsets. In many cases actuaries will naturally fit this profile.

49. Establishing processes to capture, store and evaluate (on an efficient basis) large datasets which are directly relevant to the firm's business model will also be key. However, development of systems which are capable of handling large datasets with varied data structures is likely to require high levels of investment to upgrade or replace existing infrastructure.

Q21. **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?**

50. Given the potential public interest issues arising from the increasing use of Big Data, it is important to consider the regulation of professionals working in this field, be they actuaries, data scientists, risk managers or otherwise.

51. The IFoA regulates its members to ensure the public interest, whilst supporting business and innovation. Ensuring the public interest relates to protection of the wider public and society as a whole, but also extends to ensuring public confidence in the actuarial profession by maintaining its good reputation. The public interest is served by actuaries adhering to high quality standards of work and also by the ethics and professionalism of the actuaries who deliver it.

52. As Big Data grows in importance, the IFoA will assess its regulatory framework to ensure that as public interest issues evolve, the regulation of members remains fit for purpose.

Q22. **How do you see the development of artificial intelligence or blockchain technology in connection with Big Data processes?**

53. Artificial Intelligence may create a shift in the global motor insurance market through the development of driverless cars. Similarly, connected homes may have an impact on the household insurance market and wearable fitness devices on the healthcare insurance market.

54. It is also not too difficult to imagine automated pricing models with little human input being used by certain insurers. Such an approach would naturally create a risk to insurers (as policies could be sold below the corresponding risk 'rate'). Similarly, when systems are automated it is always possible that issues such 'flash crashes' can occur, as has already been seen in the financial markets; this could easily manifest itself as a 'race to the bottom' in pricing which is implemented before human intervention is possible.

55. We also note that Artificial Intelligence systems are already being introduced in the Japanese insurance industry, and being applied to claims management processes.

56. The DP makes no mention of microinsurance –i.e. the provision of a degree of insurance to individuals on low incomes. Big Data - or blockchain - technology may allow the introduction

of new financial products/ services which could be of significant benefit to EU (and UK) citizens who do not currently have either bank accounts or insurance cover.

Should you wish to discuss any of the points raised in further detail please contact Steven Graham, Technical Policy Manager (steven.graham@actuaries.org.uk / 0207 632 2146) in the first instance.

Yours sincerely

Colin Wilson
President, Institute and Faculty of Actuaries