INTERNATIONAL ASSOCIATION OF INSURANCE SUPERVISORS

Public

Draft Issues Paper on the Use of Big Data Analytics in Insurance

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Established in 1994, the IAIS is the international standard setting body responsible for developing principles, standards and other supporting material for the supervision of the insurance sector and assisting in their implementation. The IAIS also provides a forum for Members to share their experiences and understanding of insurance supervision and insurance markets.

The IAIS coordinates its work with other international financial policymakers and associations of supervisors or regulators, and assists in shaping financial systems globally. In particular, the IAIS is a member of the Financial Stability Board (FSB), member of the Standards Advisory Council of the International Accounting Standards Board (IASB), and partner in the Access to Insurance Initiative (A2ii). In recognition of its collective expertise, the IAIS also is routinely called upon by the G20 leaders and other international standard setting bodies for input on insurance issues as well as on issues related to the regulation and supervision of the global financial sector.

Issue Papers provide background on particular topics, describe current practices, actual examples or case studies pertaining to a particular topic and/or identify related regulatory and supervisory issues and challenges. Issues Papers are primarily descriptive and not meant to create expectations on how supervisors should implement supervisory material. Issues Papers often form part of the preparatory work for developing standards and may contain recommendations for future work by the IAIS.

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Executive summary

1. This paper builds on the IAIS Issues Paper on Increasing Digitalisation in Insurance and its Potential Impact on Consumer Outcomes (November 2018)[1] by focusing more specifically on issues relating to the use of personal and other data by insurers as a result of digitalisation.

2. The scope of this paper focuses on the use of algorithms and advanced analytics capabilities by insurers to make decisions based on patterns, trends and linkages and the availability to insurers of new alternative data sources, collectively referred to as "big data analytics" (BDA).

3. To help understand the potential benefits and risks of the use of BDA by insurers, this paper considers the manner in which insurers are now able to collect, process and use data across various stages of the insurance product lifecycle, namely product design, marketing, sales and distribution, pricing and underwriting and claims handling.

4. Furthermore, in light of the outcomes for the fair treatment of customers described in Insurance Core Principles (ICPs) 18 and 19, this paper makes certain observations about the potential implications for supervisors as a result of the use of BDA in insurance.

5. The paper observes that the increased availability of data and enhanced processing capabilities now accessible to insurers can result in a number of benefits. The granularity of data from multiple sources can lead to more personalised and affordable insurance products as well as more efficient servicing for customers. Insurers can also benefit from BDA by expanding their distribution reach, ensuring more accurate pricing and lowering their cost margins due to claims savings and better fraud detection.

6. On the other hand, the paper also highlights that the complexity and opacity of algorithm technology and the ability of insurers to customise product offerings to an individual level could potentially result in risks to individual customers, as well as to the insurance sector as a whole, for which supervisors may need to devise appropriate responses. In particular supervisors may wish to consider whether the use of BDA could adversely impact the availability and affordability of insurance, potentially resulting in reduced options or no coverage for certain consumer segments. Additionally the paper suggests that supervisors think about whether there is a need to enhance governance, oversight and third party risk management requirements specific to the use of algorithms for BDA purposes.

7. While the collection, use and processing of data naturally raises issues about privacy protection and related matters, the supervision of such matters often falls outside the remit of insurance supervisors, and is not covered within the scope of this paper except to the extent addressed in Standard 19.12[2].

[1] https://www.iaisweb.org/page/supervisory-material/issues-papers//file/77816/issues-paper-on-increasing-digitalisation-in-insurance-and-its-potential-impact-on-consumer-outcomes .

[2] Standard 19.12 states that [t]he supervisor requires insurers and intermediaries to have policies and procedures for the protection and use of information on customers.

Acronyms

ABI	Association of British Insurers
AIDA	Artificial Intelligence and Data Analytics
APIs	Application Programming Interface**s**
ACCC	Australian Competition and Consumer Commission
AFM	Autoriteit Financiële Markten (Netherlands)
AI	Artificial Intelligence
BaFin	Bundesanstalt für Finanzdienstleistungsaufsicht (Germany)
BDA	Big Data Analytics
EIOPA	European Insurance and Occupational Pensions Authority
FACI	Federal Advisory Committee on Insurance (USA)
FCA	Financial Conduct Authority (UK)
FEAT	Fairness, Ethics, Accountability and Transparency
FSCA	Financial Sector Conduct Authority (South Africa)
GIA	General Insurance Association (Singapore)
GINA	Genetic Information Nondiscrimination Act of 2008 (USA)
HKFI	Hong Kong Federation of Insurers
IAIS	International Association of Insurance Supervisors
ICPs	Insurance Core Principles
IIB	Insurance Information Bureau of India
IoT	Internet of Things
IRDA	Insurance Regulatory and Development Authority (India)
MAS	Monetary Authority of Singapore
NAIC	National Association of Insurance Commissioners (USA)
SAICB	South African Insurance Crime Bureau
TCIP	Turkish National Catastrophe Insurance Pool
UBI	Usage Based Insurance

1 Introduction

1.1 Background and purpose

9. In November 2018 the IAIS published an Issues Paper on Increasing Digitalisation in Insurance and its Potential Impact on Consumer Outcomes[3] (Digitalisation Paper). That paper considered generally the impact of various technological innovations on consumer outcomes and insurance supervision in light of Insurance Core Principles (ICPs) 18 on Intermediaries and 19 on Conduct of Business.

10. One of the areas identified in the above paper was the increased availability of, and access to, consumer related-data by insurers as a result of many of the innovations described in that paper. The IAIS signalled that this would be an area for further exploration and discussion in a separate paper.

11. The purpose of this paper is therefore to consider the use of personal and other data by insurers as a result of digitalisation and to identify the benefits and risks for consumers associated with such use. Specifically this paper focuses on the increasing use of algorithms and advanced data analytics by insurers, as well as the greater availability to insurers of traditional and non-traditional (alternative) data sources. In the paper this will be collectively referred to as "big data analytics" (BDA).

12. Where data is processed and held by intermediaries, as may be the case in certain circumstances depending on their involvement in the insurance value chain, the issues identified in this paper will also be applicable as and when appropriate to intermediaries. In these circumstances references to "insurer" in the paper would include insurance intermediaries.

13. In this paper "consumer" refers to the "universe of all actual and potential customers for insurance products" and "customer" refers to the "[p]olicyholder or prospective policyholder with whom an insurer or insurance intermediary interacts, and includes, where relevant, other beneficiaries and claimants with a legitimate interest in the policy", as defined in the IAIS Glossary.[4]

14. This paper does not go into technical detail on the various types of technologies[5] available to insurers as a result of digitalisation, but rather discusses various applications of BDA by insurers across the insurance product lifecycle and considers the potential impact of these applications on outcomes for consumers and possible implications for supervisors as a result.

15. Insurers are making greater use of BDA either in direct customer interactions (eg automated advice and chatbot support during sales processes) or more indirectly (eg targeted advertising, product design, credit assessment, customer identification and verification). In

[3] https://www.iaisweb.org/page/supervisory-material/issues-papers//file/77816/issues-paper-on-increasing-digitalisation-in-insurance-and-its-potential-impact-on-consumer-outcomes .
[4] https://www.iaisweb.org/page/supervisory-material/glossary .
[5] Previous IAIS material describing the various types of technological innovations available to insurers: https://www.iaisweb.org/page/supervisory-material/other-supervisory-papers-and-reports//file/65440/report-on-fintech-developments-in-the-insurance-industry; https://www.iaisweb.org/page/supervisory-material/application-papers//file/77815/application-paper-on-the-use-of-digital-technology-in-inclusive-insurance; IAIS Digitalisation Paper .

addition the diversification of available customer data sources has created opportunities for greater individualisation of risks and pricing by insurers.

16. While such individualisation may help insurers to better understand customer needs and preferences, it could lead to accessibility and affordability challenges and possible market exclusion for some customers. The opacity of algorithms may lead to decreased comparability of products, especially if customers are only able to see or access product offerings that are individually tailored.

17. Customer segmentation on the basis of risk classes is a core feature of private insurance. Higher risk customers generally pay higher premiums than lower risk customers. The application of BDA may allow insurers to cluster customers in increasingly refined risk categories for different treatment in respect of risk selection, marketing, sales execution, underwriting, pricing and claims settlement. However, this could also reduce access to insurance and the availability and affordability of insurance for certain segments of the population.

18. ICPs 18 and 19 contemplate the delivery of fair customer outcomes across the insurance value chain irrespective of the adoption of technology or the use of more traditional means to design, market, sell, distribute or service insurance policies. A thorough and ongoing understanding of the benefits and risks associated with the application of BDA in insurance can help supervisors to develop more appropriate and proportionate responses to such applications by insurers while ensuring that the fair treatment of customers is not compromised.

19. The application of BDA also raises important questions related to the privacy, ownership, transferability and ethical use of data. Since privacy protection issues fall outside the remit of insurance supervisors in many jurisdictions, this paper does not cover these issues in detail except to the extent set out in ICP 19. Standard 19.12 requires supervisors to ensure that insurers have policies and procedures in place for the protection and use of customer data.

1.2 Approach and structure

20. In line with the approach adopted in the previous Digitalisation Paper, this paper discusses the applications of BDA across various elements of the insurance product lifecycle. The specific elements covered are: product design, marketing, sales and distribution, pricing and underwriting, and claims handling.

21. The paper is structured as follows:

- section 2 provides an overview of traditional and alternative sources, collection methods and processing of data by insurers;
- section 3 discusses potential applications of BDA across certain aspects of the insurance product lifecycle, and the associated benefits and risks of such applications; and

- section 4 concludes with key considerations, supplementary to those highlighted in the previous Digitalisation Paper[6], aimed at assisting supervisors to determine possible responses to the issues discussed in section 3.

[6] IAIS Digitalisation Paper at page 24.

2 Sources, collection and processing of data in insurance

2.1 Sources and collection of data

22. The insurance sector is heavily reliant on various types of data, used for many purposes and drawn from multiple sources. Some examples are listed in the following table:[7]

Type of data	Examples	Personal / non-personal	Use[8]	Data source
Panel A: Traditional data				
Demographic data	Age, gender, civil and family status, profession, address	Personal	Risk selection	Policyholders
Medical data	Medical history, medical condition, condition of family members, genetic testing	Personal	Risk selection	Policyholders
Exposure data	Type of car, value of building contents, type and features of dwellings	Personal/ non-personal	Risk selection	Policyholders
Behavioural data	Smoking, drinking behaviour, distance driven in a year, deductible choice, life insurance lapse rates	Personal/ non-personal	Risk selection, marketing	Policyholders, industry statistics
Loss data	Claim reports from car accidents, liability cases	Personal/ non-personal	Claims management	Policyholders, information exchange within industry
Population data	Mortality rates, morbidity rates, car accidents	Anonymised and aggregated personal data	Risk selection	Government, industry statistics, academia
Hazard data	Frequency and severity of natural hazards	Non-personal	Risk selection	Government, industry statistics, academia
Other traditional data	Credit reference, claim adjustment reports, information from the auto repair shops	Personal/ non-personal	Risk selection, marketing, claims management	Policyholders, credit agents, partner adjusters or agencies involved in the claim
Panel B: New and 'non-traditional' data				
IoT data	Driving behaviour (telematics), physical activity and medical condition (wearables), surveillance (smart home)	Personal	Risk selection, claims management	Data collection devices
Online media data	Web searches, online buying behaviour, social media activities	Personal	Risk selection, marketing	Technology companies (Internet providers, search engine providers, e-commerce providers, social media platforms)
Personal preference data	Mobile phone operating system, email addresses	Personal	Risk selection, marketing, product development	Technology companies, Policyholders

[7] Source: Big Data and Insurance: Implications for Innovation, Competition and Privacy, Geneva Association, March 2018. The table does not represent an exhaustive list of data types and sources. Depending on the circumstances insurers may collect other types of data from other sources not specifically listed in the table.

[8] Here risk selection includes pricing and underwriting; marketing includes distribution and sales activities; claims management includes fraud detection.

23. Insurers may collect data actively or passively through direct or indirect means.

24. Active data collection usually occurs during application and registration processes where customers are specifically requested or required to share certain data. With passive collection, on the other hand, customers may sometimes unknowingly share data (eg by providing or sharing location data through mobile or telematics devices).

25. Insurers may collect data from customers as a result of direct interactions, or indirectly through outsourced service providers or other third parties (eg credit scoring, background verification, marketing or advertising companies, or consumer and claims handling databases).

26. Offline collection of data may be done in person, in writing, through manual forms or over the phone, while online collection may be done through web browsers, social media platforms, game consoles, tablets, smart devices and other types of electronic communication.

27. Digitalisation in insurance has resulted in the availability and use of new data sources, also known as "alternative data". This type of data is not collected or produced by the insurer as result of direct customer interactions but taken from indirect sources such as mobile devices, sensors, satellite technology and the internet. Since alternative data sets can be voluminous, they require the application of algorithms and advanced analytics to help derive meaningful and usable insights, as described in subsection 2.2 below.

28. Depending on the source and method of collection, data may be accessible to insurers within an insurance context or outside of it, thereby leaving the original context for which the sharing of the specific data was intended. For example, data collected from a telematics device would be within an insurance context, whereas data collected from Facebook would be outside an insurance context.

Examples:

Netherlands

In the Netherlands, an important source of data is MijnOverheid, where personal data is stored from different institutions, such as government services and pension funds. For example, customers that ask financial planners to develop financial plans, can download their pension data from MijnOverheid and then upload it to the server of their financial planners. This way, all their pension entitlements are immediately taken into account for their financial plans. Other data in MijnOverheid is an individual's income data.

Singapore

A key component of Singapore's National Digital Identity system is MyInfo, a digital service that enables citizens to authorise third parties to access their personal data that is stored across different government agencies. With consent, third parties can use MyInfo's application programming interfaces (APIs) to access government-verified data to authenticate their customers and make business decisions relating to them. Currently more than 20 financial institutions are using MyInfo to provide more than 110 digital financial services.

European Union

The European Insurance and Occupational Pensions Authority (EIOPA) recently conducted a thematic review on the use of BDA in motor and health insurance. The review showed how traditional data sources such as demographic data or exposure data are increasingly combined (not replaced) with new sources like online media data or telematics

data, providing greater granularity and frequency of information about consumers' characteristics, behaviour and lifestyles.[9] This enables the development of more tailored products and services and more accurate risk assessments.

2.2 Processing of data

29. The processing of customer data, whether done in-house or by an outsourced third party provider, is a critical component of an insurer's business. It helps inform, for example, the insurer's business and marketing strategies, service delivery and distribution models, product range, risk selection and pricing structures.

30. Digitalisation has resulted in significant changes to the manner in which data can be processed and leveraged by insurers as they now have access to greatly enhanced levels of computing power and analytical capabilities.

31. The increased availability of customer data, more sophisticated tools for collecting, safeguarding, transferring and analysing this data, and growing appetite for the use of new technologies have created increased opportunities for insurers to adopt the use of algorithms for various purposes.

32. Algorithms can be used by insurers for direct customer servicing (eg to provide automated advice and pre- and post-sales support) or more indirectly (eg to design targeted advertising campaigns, obtain insights on consumer preferences, influence consumer behaviour, inform product design, risk selection and pricing, assess credit worthiness, conduct "know your customer" and other identification and verification checks).

33. The increasing reliance on the use of algorithms by insurers for the processing of customer data may create a number of challenges and risks.

34. Algorithms can be complex and are often treated as proprietary and highly confidential in nature. Thus, there can be a lack of transparency and strong asymmetry of understanding between those who design and use algorithms and customers and supervisors trying to understand the outcomes generated by these algorithms.

35. Machine learning algorithms are based on historical data and, therefore, generally reproduce the past. This can increase the likelihood that algorithms may perpetuate unforeseen biases, which in turn create risks of errors potentially resulting in inequitable or unsuitable customer outcomes.

36. Additionally, the effectiveness of an algorithm is dependent on the quality, accuracy and completeness of available data, and can be hampered by possible errors in its initial design or programming.

37. There is also a risk that customer segments could be differentiated on the basis of false assumptions or false conclusions drawn by algorithms on the basis of these assumptions, resulting in unlawful discrimination against certain customers.[10]

Example:
United Kingdom

[9] https://eiopa.europa.eu/Publications/EIOPA_BigDataAnalytics_ThematicReview_April2019.pdf .
[10] https://www.bafin.de/SharedDocs/Downloads/EN/dl_bdai_studie_en.html at page 177.

In the UK, a BBC investigation compared car insurance quotes from the five leading price comparison websites, first using the name of a white British BBC producer, and then a different common British name, 'Muhammad Khan'. All five sites returned higher prices for Muhammad Khan.[11]

38. Enhancements in machine learning capabilities may also result in the operation of algorithms becoming increasingly complex even for those who design them.

39. Algorithms may be used alongside, rather than instead of, established techniques such as generalised linear models, to provide new insights to insurers. Nevertheless the governance and oversight of algorithm applications may prove to be challenging and could require specific technical expertise and more robust auditing mechanisms within insurers and supervisors to adequately mitigate risks that could potentially arise as a result of the above factors.

Examples:

Netherlands

The Netherlands Autoriteit Financiële Markten (AFM) has published guidance on the development of algorithms used in robo advice. A key requirement is testing of the algorithm, both before and after launching the robo advisor. When developing the robo advice, the insurer must be satisfied that sufficient knowledge of financial products is present in order to ensure that the robo advice is of sufficient quality. The development and testing of the robo advice must be carried out thoroughly enough so that it can be demonstrated that the advice is suitable when the system goes live.

The supervisor's approach to supervising robo advice and its underlying algorithms is as follows:

(i) the supervisor will assess the input and output of the robo advisor. This is equivalent to the supervision of physical advice files where consideration is given to whether all relevant data has been obtained and used in order to arrive at the appropriate outcome based on the customer's needs and circumstances;

(ii) the supervisor will assess the conditions under which the algorithm was developed in order to determine whether it was developed with enough knowledge of the advice process and adequately tested; and

(iii) the supervisor is now also considering whether it should directly supervise the design of the algorithm itself.

Singapore

In its Guidelines on Provision of Digital Advisory Services, the Monetary Authority of Singapore (MAS) requires digital advisers to put in place adequate governance and supervisory arrangements to effectively mitigate the risks that stem from the use of algorithms.[12] These include requiring:

(i) board and senior management of digital advisers to maintain effective oversight and ensure that there are sufficient resources to monitor and supervise the performance of the algorithms; and

[11] https://www.bbc.com/news/business-43011882 .

[12] https://www.mas.gov.sg/-/media/MAS/Regulations-and-Financial-Stability/Regulations-Guidance-and-Licensing/Securities-Futures-and-Fund-Management/Guidelines-on-Provision-of-Digital-Advisory-Services--CMGG02.pdf .

(ii) digital advisers to have in place policies and procedures governing the development, monitoring and testing of algorithms, as well as when changes are made to the algorithms.

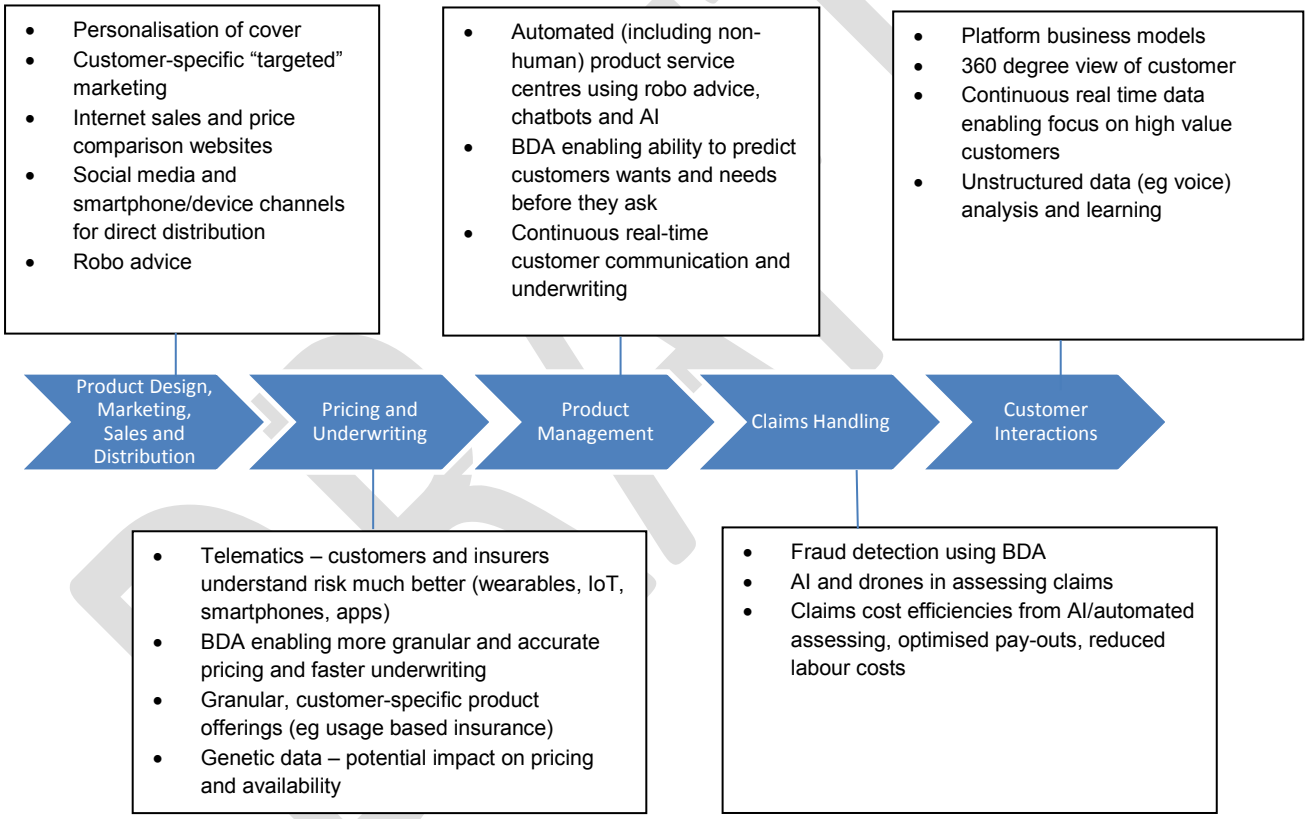
3 The use of big data analytics across the insurance product lifecycle

40. BDA can be used across various components of the insurance product lifecycle, as shown by the examples in diagram 1 below.

41. This paper does not cover all the elements contained in diagram 1, but rather focuses on a few key areas of the lifecycle where the use of BDA has been identified as potentially introducing significant benefits and risks for insurers, consumers and supervisors.

42. Some aspects such as robo advice[13] and price comparison websites[14] that were covered in the previous Digitalisation paper have not been included in this paper. In addition, the customer interaction component is not discussed separately as represented in the diagram, but rather incorporated within discussions on the other elements of the product lifecycle where relevant.

Diagram 1: The use of BDA across the insurance product lifecycle



3.1 Product design, marketing, sales and distribution

3.1.1 Personalised insurance cover

43. Generally there are a number of benefits in using BDA for product design purposes. Greater access to, and increased efficiencies in the collection and evaluation of, more data types such as behavioural data can make (new) risks insurable and allow consumers to get cover previously not available to them. The use of BDA allows insurers to better understand

[13] IAIS Digitalisation Paper at page 17.
[14] IAIS Digitalisation Paper at page 19.

customers' needs, wants and behaviours, resulting in risk profiling becoming more granular and customised.

44. Information from large data sources can be used to offer (mass) customised insurance products and services at a lower cost to the insurer, and any resultant savings being passed on to customers. Mass customisation involves products/bundles that are designed for mass markets (resulting in efficiency gains), but which are adjusted slightly for different customers based on individual customer insights obtained through the application of BDA. At their core, these products are not truly individualised, in that they simply follow a mass targeted design template, with minor refinements being made based on the preferences of particular customers. For example, a modular vehicle insurance product or a bundled product made up of several components could include non-insurance or optional value added benefits, such as roadside assist. This can be done at minimal cost to the insurer.

45. Access to large data sets can also allow insurers to design complex customer specific products more easily and cost effectively. What would previously have taken a specialist intermediary and significant underwriting or actuarial resources to design can now be achieved quicker and with less effort as a result of BDA, potentially resulting in wider customer access and reduced underwriting costs.

46. The application of BDA can enable the provision of usage-based insurance (UBI) products where customers purchase cover for only short periods of time when they require it.[15] In motor vehicle insurance, UBI may be helpful for drivers who only use their cars occasionally as insurance is charged according to the distance travelled. UBI may also be useful for cover during periods of travel or when engaging in certain sporting activities. This could make insurance cheaper and make customers more conscious of the need to avoid or mitigate risky behaviour. However, such products potentially create risks if customers forget to activate or deactivate their cover as and when necessary.

47. It remains the responsibility of insurers to ensure that design decisions are made transparently and can be explained to, and understood by, customers and supervisors.[16] It is also important for insurers to manage the risk of customers potentially misconstruing personalised product offerings as the provision of financial advice in the absence of any necessary suitability and needs analyses being conducted.

Examples:

Netherlands

A Dutch insurer is investigating whether it can determine car insurance premiums by machine learning. Traditionally, this premium is calculated in a linear way. For example, both the age of the car and the postal code of the area where the owner lives determines the appropriateness of the premium. With algorithms and machine learning, the calculation of the premium happens in a dynamic way, for example investigating the interaction between the age of the car and the postal code. Other variables can be taken into account as well, such as the customer's driving behaviour and previous damage. The idea is that as the algorithm learns from the data, it will become increasingly accurate in determining the odds of damage (and therefore the premium).

[15] IAIS Digitalisation Paper at page 11.
[16] https://www.bafin.de/SharedDocs/Downloads/EN/dl_bdai_studie_en.html at page 13.

Germany

In Germany, a number of insurers offer “telematics tariffs” for their motor vehicle policies. Premiums on telematics tariffs are calculated taking into account the individual driving behaviour (eg braking, speed and acceleration) and other external factors such as time and place of the ride. Sometimes there is a maximum age limit for the policyholder. The data is recorded either via apps or "black boxes" permanently installed in the vehicles. The data evaluation (ie scoring) is usually not carried out by the insurer itself, but is outsourced to third parties. Some insurers have set up special group-internal subsidiaries for that task, in order to avoid mixing of the different data sets.

Japan

A Japanese insurer launched a “one time” insurance product jointly with a mobile communications company. For example, users get a text message with a product recommendation the first time they arrive at a golf course offering insurance that will cover the expenses of treatment for any injuries and damage liabilities, and asking if they want to take this cover out immediately. The product’s design is based on users’ golf playing characteristics and allows them to be insured on a daily basis.

3.1.2 Targeted marketing

48. Insurers can use behavioural and lifestyle indicators derived from BDA to identify opportunities that are specific to certain customer segments and to nudge these customers using targeted marketing messages and campaigns. For example, couples expecting children can be identified to receive life insurance messages. Older customers could receive targeted funeral insurance messaging. These messages can be delivered in real time via smart devices when a customer is passing an insurer’s branch office or visiting specific websites or other social media platforms.

49. Insurers may be able to anticipate risks and the need for an insurance product based on a customer’s day to day activities. Insurers can then interact with customers in real time to offer them a specific product or product options to fulfil that need. For example, through the use of BDA on social media updates and location tracking data an insurer can identify if a customer is planning a holiday or other type of trip and then, in a targeted manner, offer the customer travel insurance. In this way product offerings can be personalised and targeted to a specific customer.

50. In general, insights gained from BDA present opportunities for insurers to identify potential gaps in customers’ insurance needs and pre-emptively nudge them to consider seeking out appropriate cover through the use of targeted advertising. These insights can also be used to target products at particular customer groups that have been identified as having shared characteristics and then targeted accordingly.

Examples:

USA

A US-based insurer gathers data from social media platforms as well as its own interactive digital services and uses sophisticated analytics systems to highly personalise all aspects of its engagement with customers. Its digital car buying service advises customers not only when they are buying motor vehicle insurance but also when they are looking to purchase, repair or sell a vehicle. Moreover, the insurer helps customers plan and manage their finances by providing them with fully-digital mobile tools tailored for various stages of life

and cultivates close ties with its customers by promoting social media community groups. It also has an online advisory service which addresses a wide range of professional and personal circumstances.

United Kingdom

Customers with special insurance needs, such as cover for pets or expensive gadgets, often find it difficult to find the right policy or attractive rates. Advanced analytics tools allow insurers to find and service such customers. A UK-based start-up analyses search engine and social media data to identify groups of customers with uncommon insurance requirements. It then approaches insurers on behalf of the group, in order to negotiate better rates for them.

51. However, there are also potential risks in that these tailored or targeted campaigns may limit the ability of customers to compare a wider variety of products offerings. This could result in less informed decision-making, reduced choice and greater difficulties in product switching for customers.

52. Targeted product offerings based on the use of BDA in response to specific customer behaviours, incidents or activities could also result in over-insurance as customers may be influenced to buy more insurance than they need, and/or make decisions about purchasing insurance cover within a specific context without considering their overall financial needs or affordability.

53. While targeted offerings may mean that customers are offered appropriate cover at a sensible time based on a specific context, this sort of marketing may also be perceived as opportunistic and could increase cynicism and disengagement by customers.

3.1.3 Sales execution

54. People lead increasingly busy lives and are sometimes unwilling or unable to devote time and energy to make decisions or go through lengthy administrative processes relating to their insurance. Insurers could be incentivised to play on these behavioural biases to discourage customers from switching to other providers. BDA can help to mitigate these factors. It is possible, for instance, to use data to pre-populate forms or find other efficiencies in the sales process. Insurers quoting for home insurance, for example, could look at data from flood maps rather than asking customers how far they are from water sources.

55. Shorter, simpler application forms should make it easier for customers to engage and reduce the risk of them making mistakes in their answers, which could later be used as a basis to repudiate their claims. A risk of relying too heavily on this data during sales execution, however, is that insurers may not gather sufficient customer insights to offer contracts that fully meet their personal needs. Additionally, reliance on insufficient data could result in the overestimation or underestimation of premiums that are charged to customers. This could potentially impact the profitability or overall solvency of insurers.

Examples:

United Kingdom

A large UK insurer quoting for home insurance aims to provide accurate premiums using data customers have previously provided as well as other sources, such as land registry data, to simplify the quotation process, remove uncertainty for customers and avoid duplication. In this way, the insurer applies a shortened home insurance process to all home

insurance 'quote and buy journeys' through the insurer's website, online portal and mobile app. The insurer intends to apply this to claims processes, arguing that the provision of accurate data reduces the risk of a having home insurance claims rejected.

Canada

A Quebec-based digital insurance brokerage takes care of motor vehicle and home insurance re-shopping for customers. They build a detailed profile on behalf of customers and, before their policies expire, present them with a small number of curated alternatives that can be purchased in minutes. Powered by artificial intelligence and licensed insurance brokers, it shops around every time a policy is up for renewal, compares 10 leading options from 10 different carriers and submits the best one based on the customer's profile year by year.

3.1.4 Distribution and advice

56. Insurers can use consumer and market insights gained from BDA to extend the reach and scale of their distribution capability beyond their existing traditional branch networks and call centres. This extended capability presents opportunities for access to wider consumer bases, product updates and cross-selling, potentially resulting in more choice for consumers.

57. Insurers can use BDA insights to evaluate customers' past behaviour, recent actions and needs in order to deliver the right message, at the right time, and via the right communication channel. This can facilitate an enhanced customer interaction process through appropriately tailored communication and the use of an optimal distribution channel mix.

58. Some insurers are pursuing single direct platforms to address the growing needs of their digital-only customers in a holistic manner by consolidating various sources of data into a "single view of the customer". All product distribution, as well as the bulk of their marketing, sales, underwriting and support, is accomplished using a single digital platform. This can allow insurers to accurately develop business volume forecasts and customer lifetime value estimations, and define customer loyalty and retention campaigns, sometimes with real-time response capabilities.

Example:

France

Several insurance groups have begun moving to cross-channel content strategies ("omni-channel") in order to give their customers convenience when they decide to interact with them. One insurer is employing artificial intelligence (AI) and data analytics to better understand its sales processes. It is using these insights to develop systems that are more appealing to customers and more rewarding for its agents and partners.

59. Insurers may also utilise their customer base to curate platforms that offer complementary products, by using insights gained from BDA to make non-insurance products and services available to customers alongside insurance products. Insurers can also offer these insights to other businesses, either within their broader group structures or externally, that may wish to offer other products. Additionally, BDA insights gained from partnerships with non-insurance businesses could enable insurers to offer correlated insurance products (eg customers having the option to purchase travel insurance directly with the insurer when booking a flight through a partner airline or travel agent). Insurers engaging in these types of

cross-selling strategies would need to take into account applicable data protection laws and the importance of managing customer expectations.

Example:

Australia

In 2016 an Australian bancassurer announced its intention to develop a customer marketplace online portal to offer its customers products manufactured, and services offered, by other companies as well as its own. The marketplace portal is premised on a strategy that recognises that customer value creation is not limited to products manufactured by the insurer itself. The centrepiece of the strategy is a mobile application that went live in 2018, and at that time the marketplace included links to businesses such as those in conveyancing and car maintenance.

3.2 Pricing and underwriting

3.2.1 Increased granularity in risk selection and pricing

60. Historically certain risks would have been associated with very high fixed costs so that insuring them would not be profitable or economically viable, or products would need to be priced so high resulting in the demand being too low to justify such offerings. BDA provides insurers with the ability to insure certain previously "uninsurable" risks at an affordable price.[17] For example, through automated evaluation of complex, high-volume data sets on the progression of diseases, it could become possible to further extend life insurance cover to HIV-positive customers, or to offer such cover quicker and/or at lower rates. The same could apply to homeowner insurance for buildings in flood and disaster-prone areas. Using satellite pictures and geo data, insurers can identify and assess such areas more precisely. Customers who might want to take up these policies at lower rates offered by insurers who have access to these types of BDA insights may, however, sometimes be unaware of these lower rates.[18]

61. Granular individual-based approaches to pricing can affect individual insurance premiums. Low claim customers who need less insurance may see insurance costs go down. On the other hand, high risk, higher claiming customers may see fewer product offerings and increased pricing. This could result in affordability issues for certain segments of the market.

62. Whilst the consideration of factors affecting affordability is not new, historically it has tended to be limited to easily identifiable population demographics, such as geography or age. However, the use of BDA may change this. For example, affordability may depend on driving patterns which are a result of an individual's personal situation (eg shift workers driving at night, parents dropping children at school in the morning). This is particularly concerning where insurance is, in effect, an essential service or compulsory. This could raise policy level questions on the need to balance appropriate levels of granularity for risk categorisation purposes with the potentially greater social need to ensure the affordability and inclusiveness of insurance products.

[17] https://www.bafin.de/SharedDocs/Downloads/EN/dl_bdai_studie_en.html at page100.
[18] https://www.fca.org.uk/publication/feedback/fs18-01.pdf .

63. One study predicts that the very nature of risk could change as a result of reduced uncertainty due to ongoing improvements in tracking and predictive technologies.[19] As a consequence premiums are expected to come under pressure, reducing revenue streams. From a consumer protection perspective, therefore, the application of BDA in pricing could increase the incentive for insurers to exploit differences in premium levels, including through the practice of price optimisation as discussed below.

3.2.2 Price optimisation

64. Price optimisation is the practice of utilising a variety of individualised factors other than just risk to determine the "ideal" or highest premium that can be charged in a particular instance, based on the strength of customer demand.

65. Price optimisation has always occurred in some form or another in insurance. In the past it was a case of underwriters using their discretion and judgement to adjust prices.[20] This was often done at a customer-segment level or across an entire portfolio of risks. The use of BDA has now introduced the ability to adjust prices at a more granular customer-specific level.[21]

66. This can be done in two ways. First, algorithms and advanced statistical modelling can be applied to traditional data sources. Second, those algorithms and advanced statistical modelling techniques can be applied to "new" or alternative sources such as IoT data and online media data.

67. Linking financial transaction and behavioural data with data on preferences and needs can provide insights on a customer's willingness and ability to pay. Data potentially sourced from different and unrelated contexts may show that Customer X would pay any price for a particular product while Customer Y would be very price conscious. If a customer's demand for an insurance product is high or the customer is inert and/or unlikely to shop around the risk price will be increased. Alternatively, if the customer's demand for an insurance product is low and they are more likely to be flexible, the risk price will be reduced. In each circumstance the specific customer would likely be asked to pay the maximum price they are prepared to pay based on the insights accumulated from the use of BDA, resulting in differential pricing for the same or similar products across different customers.

68. The use of BDA in this way gives rise to many potential concerns including a lack of disclosure and transparency in pricing, and issues around affordability and inclusion. It also raises fairness questions about the potential exploitation of customer inertia which is sometimes a result of customers having limited time, ability or opportunity to shop around for cheaper products. This concern would be heightened in cases of vulnerable consumer groups (eg elderly customers and/or customers with lower income or education levels). Insurers benefiting from this type of premium differential (at an individual level) may diminish the overall value of insurance by emphasising price over quality of cover. This could negatively impact consumer trust thereby causing reputational risks for the insurance sector.

[19] https://www.mckinsey.com/industries/financial-services/our-insights/insurance-beyond-digital-the-rise-of-ecosystems-and-platforms .

[20] NAIC White Paper on Price Optimization at paragraph 5. See https://www.naic.org/documents/committees_c_catf_related_price_optimization_white_paper.pdf .

[21] NAIC White paper at paragraph 6.

Examples:

United States

In the US, state insurance supervisors are concerned that price optimisation may be a departure from traditional cost-based rate making and a move towards rate making based in part on customers' price sensitivity. Consequently, a number of states have taken pre-emptive action to ban the practice. Several states issued bulletins stating that price optimisation results in rates that are unfairly discriminatory. Some of these states are also requiring insurers to remove price optimisation factors from rate filings. Additionally, the National Association of Insurance Commissioners (NAIC) adopted a Price Optimization White Paper[22] that provides background information on state rating law, actuarial principles, and price optimisation, including an overview of various definitions of price optimisation used by stakeholders. The White Paper also identifies potential benefits and drawbacks of price optimisation, which includes concerns raised by consumer advocacy groups.

United Kingdom

In the UK, the pricing practices of insurers are a focus of regulatory attention, in particular differential prices for new and renewing customers of home and motor insurance. In October 2018 the FCA published a discussion paper on fair pricing in financial services[23] and launched a market study into general insurance pricing practices[24]. The market study is looking at the scale of any harm to customers from general insurance pricing practices, who it affects and, if required, what actions are required to improve the market.

Netherlands

Comparison websites in the Netherlands indicate that insurance companies are increasingly making use of dynamic pricing and dynamic characteristics, so that both the price and policy conditions are determined 'on demand'. This brings challenges for supervisors. For example, there are concerns about how careful development of an insurance product can be monitored or supervised if the terms of the insurance policy differ from customer to customer.

India

Differential pricing on the basis of customer demand and/or willingness to pay is not allowed in India as product pricing is subject to regulatory approval by the Insurance Regulatory and Development Authority (IRDA). Premiums may be varied based only on narrowly defined rating criteria.

3.2.3 Underwriting

69. Generally, the use of BDA in underwriting can have a number of benefits for customers. BDA can enable insurers to notify customers in real time when certain behaviours or an activity they are planning or engaged in may give rise to risks that can be mitigated with insurance cover. As mentioned previously, an example would be an insurer using BDA applied to social media updates and location tracking to identify that a customer is about to go on holiday and might need travel insurance, or if they need enhancements to their travel insurance with specific coverage such as when the customer is looking to undertake more hazardous activities such as skiing or mountain climbing. BDA may also assist customers by providing

[22] See footnote 20.
[23] https://www.fca.org.uk/publications/discussion-papers/dp18-9-fair-pricing-financial-services .
[24] https://www.fca.org.uk/publications/market-studies/ms18-1-general-insurance-pricing-practices-market-study .

solutions to help them better understand the size of their risk exposure and the amount of coverage that would be appropriate to cover that exposure.

70. The application of BDA also offers new solutions to the challenge of underinsurance, including through the development of a new generation of insurance calculators offered at point of sale to aid customers to estimate the cost of repairing their homes. For example, BDA can be used to draw on and analyse large volumes of data about a particular location, its susceptibility to major disasters, weather patterns and the cost of repairs based on demand surge costs rather than at normal times to better estimate the cost of rebuilding a specific customer's home.

Examples:

Netherlands

In the Netherlands, insurers make use of the services of an information technology company that calculates the reconstruction value of a home under a property insurance policy. Traditionally, this value was estimated based on year of construction, the cubic metres, the type of house and the construction. However, this company claims to have access to more than a hundred other variables that can all be used for a more adequate estimation than the traditional variables.

Turkey

In Turkey, the Natural Disaster Insurance Institution provides compulsory earthquake insurance through the Turkish National Catastrophe Insurance Pool (TCIP)[25], utilising specific data provided by customers. This data includes the address, gross area, building year and construction type of the dwelling. After receiving the required data, an algorithm calculates the insurance premium automatically. A calculation tool is available to customers on the TCIP's website which makes it possible to calculate the insurance premium before issuance of a policy.[26]

71. As product development becomes increasingly dependent on the availability of personalised customer insights there is a risk that customers who do not have access to digital devices or do not want to provide personal data (beyond what is legally required) may become marginalised and even excluded from insurance. This may be because customers simply cannot afford smart devices (which are increasingly expensive), do not have reliable or affordable access to the internet, or do not share data online. Other customers may simply not wish to provide arguably sensitive, personalised data about themselves to an insurer or outsourced third party. Additionally, some customers may have challenges with, or be resistant to, using innovative technologies.

72. There may also be potential for vulnerable high-risk customers to become uninsurable. The use of BDA enables insurers to personalise product offerings and to identify which customers are higher risk and therefore more likely to claim. In the interest of maximising profit margins, insurers may be less likely to provide cover to customers in instances where BDA reveals such customers to be more likely to claim or unable to consistently pay the premiums necessary to insure their risks. This could result in financial exclusion, under-insurance and

[25] https://dask.gov.tr/tcip/ .
[26] https://www.dask.gov.tr/e-services/portal/calculatePremiumEng .

the creation of an uninsurable subset of customers. This is particularly concerning where insurance is, in effect, an essential service or compulsory.

Example:

Australia

In its recently published North Australia Insurance Inquiry Interim Report[27] the Australian Competition and Consumer Commission (ACCC) observed that many insurers were seeking to reduce their exposure to high risk customers by actively not competing. This was creating accessibility and affordability issues in North Australian home insurance markets. Insurers used BDA technology to identify customers whose residences were in areas highly susceptible to cyclone and flood risk from multiple data sources including geographical surveys and historical weather reports. Insurers would then actively seek to reduce their exposure to these customer groups either directly by not writing new business in these areas or indirectly by increasing prices until their exposure decreased. Similarly, insurers also used "price-bots" to analyse prices offered by competitors to identify if they were offering the lowest prices in these high risk markets – and then increase their prices to ensure that they were not.

73. It is now possible to predict with accuracy a customer's life expectancy and likelihood of sickness using genetic data. BDA applications also have the potential to expand beyond genetic data.[28] These types of insights can potentially make large segments of society uninsurable. As a result, many jurisdictions are now implementing significant restrictions on the use of genetic and related data for insurance purposes.

Examples:

Canada

In Canada the Genetic Non-Discrimination Act, S.C. 2017, c. 3 has been in force since 2017.[29] The Act prohibits people and businesses from requiring the results of genetic tests when providing goods and services, entering into contractual agreements, or offering specific terms or conditions in contracts, including insurance policies. The Act also prohibits the denial of services to individuals who refuse to undergo genetic tests and requires written consent for the collection, use and disclosure of individuals' genetic test results. However, the constitutionality of the Act has been challenged and the hearing before the Supreme Court of Canada is scheduled for October 2019.[30]

United Kingdom

In October 2018 the Association of British Insurers (ABI) and the UK Government published a code of practice on the role of genetic testing in insurance.[31]

Germany

[27] https://www.accc.gov.au/focus-areas/inquiries/northern-australia-insurance-inquiry.

[28] https://www.theverge.com/2018/2/19/17027902/google-verily-ai-algorithm-eye-scan-heart-disease-cardiovascular-risk .

[29] https://laws-lois.justice.gc.ca/eng/acts/G-2.5/page-1.html .

[30] https://www.scc-csc.ca/case-dossier/info/sum-som-eng.aspx?cas=38478 .

[31] https://www.abi.org.uk/globalassets/files/publications/public/genetics/code-on-genetic-testing-and-insurance_embargoed.pdf; https://www.abi.org.uk/news/news-articles/2018/10/abi-and-government-publish-updated-code-on-genetic-testing--insurance/.

The use of genetic data in the insurance sector is strictly regulated. In private health insurance the insurer may not, either before or after the conclusion of the insurance contract, require genetic tests or analysis to be carried out or require the communication of results or data from genetic tests or analysis already carried out, or receive or use such results or data. This does not apply to life insurance, occupational disability insurance, occupational disability insurance and long-term care insurance if a benefit of more than €300,000 or more than €30,000 per annum is agreed.[32]

Australia

In October 2018 the Australian Financial Services Council (trade body for the life insurance industry) announced that it was consulting on a moratorium to stop the use of genetic test results as part of insurance applications, enabling every Australian to get up to $500,000 worth of life cover without having to disclose adverse test results.[33] On 21 June 2019 it released FSC Standard 11: Moratorium on genetic tests in life insurance, which takes effect on 1 July 2019.[34]

Switzerland

The Swiss Federal Act on Genetic Testing on Humans places restrictions on the use of genetic data in insurance.[35] In general, for socially important insurance, the use of such data is prohibited. For other types of insurance cover, the use is strictly regulated. In third-party liability cases it is generally forbidden to use genetic data or to ask for genetic screening (eg for the assessment of claims).

United States

In the US, the Genetic Information Nondiscrimination Act of 2008 (GINA) prohibits the use of genetic information in decisions relating to health insurance eligibility or coverage.[36] While this prohibition does not apply to other forms of insurance (eg disability, long-term care or life insurance), some individual states have passed laws prohibiting the use of genetic data in other types of insurance.[37]

3.3 Claims handling

3.3.1 Risk mitigation and loss reduction

74. One way insurers can use BDA to improve claims handling is to help customers avoid having to make claims in the first place. By using BDA to assess individual risk and claim behaviours more accurately, customers can be nudged, post-sale, towards decisions and actions aimed at reducing the likelihood of risks materialising or to mitigate potential losses in the event that such risks do materialise. Examples of these include improving driving habits, making healthier lifestyle choices or taking preventative measures as a result of early warnings about poor weather or other hazardous conditions.

75. While insurers are known to rely predominantly on historical data for actuarial calculation and risk modelling purposes, they are now able to rely on data sources that are real time or even forward-looking. For example, "smart drivers" continuously produce data

[32] §§18 GenDG, 213 VVG.
[33] https://www.fsc.org.au/policy/life-insurance .
[34] https://www.fsc.org.au/news/media-releases .
[35] https://www.admin.ch/opc/en/classified-compilation/20011087/201401010000/810.12.pdf .
[36] https://www.congress.gov/110/plaws/publ233/PLAW-110publ233.pdf .
[37] https://www.genome.gov/about-genomics/policy-issues/Genetic-Discrimination .

while they are driving. The risk of accidents decreases due to better driving behaviour that can be tracked and rewarded by insurers through the use of telematics, resulting in claims savings for insurers. In return, customers who use such devices may receive better insurance rates and potentially benefit from improved risk behaviours such as better driving.

76. The analysis of data from IoT sources such as sensors and other connected devices in homes and businesses is also a strong enabler for proactive loss prevention and may result in reductions in the frequency and severity of claims.

Examples:

Various

Insurers in various jurisdictions offer customers rewards or discounts on their car insurance premiums if they drive safely. Their driving behaviour is measured by a device that is plugged into the car or other connected solutions. These products could lower overall damage rates, as customers have an incentive to drive safely.

The connected home market has also attracted several major multinational equipment and service providers. Many global technology and media companies are leveraging their extensive presence in the entertainment market to deliver online security and safety products. Some insurers have also introduced successful connected home solutions that go beyond insurance and offer threat prevention and safety alerts.

The connected health and fitness market is also growing fast. There are more and more portable health devices attached to people around the world daily. Globally several insurers have launched connected solutions designed to improve the wellbeing of their customers.

Most, if not all, of these offerings are fully digital. They leverage the capabilities of analytics, mobile technology and social media channels to offer real-time protection rather than just indemnification.

Some life insurers have introduced features in their mobile apps to encourage healthy living and increase opportunities to engage with customers.

77. Behavioural changes and improved risk mitigation can contribute to greater societal issues beyond insurance. Improved awareness and prevention of dangerous driving habits may reduce motor vehicle accidents and fatalities. Likewise, BDA insights that encourage healthier lifestyles may reduce pressure on publicly-funded emergency and medical services and reliance on safety nets such as social welfare and public healthcare.

3.3.2 Claims processing

78. The use of BDA in claims processing can lead to a number of efficiency gains resulting in reduced costs for insurers and customers. The claims settlement process could be improved through (partially) automated claims approvals or rejections, subject to appropriate consideration being given to fair customer outcomes. For example, digital loss assessment and repair can occur on the basis of picture recognition or sensor data in combination with invoice data for more accurate pay out calculations. Drone technology is also being used in many instances for video inspection of damages to assess claims quicker and with more accuracy.

Example:

Germany

In Germany most insurers offer apps in private health insurance for claims notification and processing based on pictures of receipts.

A German agricultural loss insurer is using drone technology to automatically evaluate damages based on images taken by the drones. However, the insurer also regards the human factor as important in the assessment process.

79. The use of BDA can also allow insurers to calculate and produce claims pay outs quicker and more accurately based on historical claims data, allowing for the fast tracking of certain types of claims with minimal friction for the customer.

Examples:

Singapore

In August 2018, an insurer tested a blockchain-based insurance solution that offered pregnant women financial protection in the case of gestational diabetes. Through an app on their mobile device, the product can connect securely to a customer's electronic medical records to perform parametric underwriting. If a customer is eligible, a "smart contract" policy is immediately generated. Upon diagnosis, the customer's medical data triggers an automated benefit payment with no further action required. This improves data security as the insurer does not require access to the underlying medical data to confirm insurability or to review claims.

In June 2019, this solution was piloted with the country's largest newspaper and a major Singapore-based insurer to automate the life insurance claim verification process. When family members file an obituary with the newspaper, they will be informed about the product and upon their consent, the deceased's national identity number will be submitted to the Blockchain as hashed data to search for a matching life insurance policy. If a match is found, an automatic notification will be sent to the insurer to initiate the claims process.

United Kingdom

Parametric insurance is increasing in prevalence across the sector. Agreeing to payments up front can be beneficial for some customers over traditional insurance products by providing greater certainty and speed when a legitimate claim is made. In the UK an insurer has developed a flood insurance product that involves an instant pay-out of a pre-agreed amount being triggered when flood water reaches a pre-agreed depth on the sensor installed by the insurer at the property. Similar models are also used in flight delay and cancellation insurance products, where integration with a data feed providing live data on flight status enables the near instant pay-out of a claim in the event of a flight being delayed or cancelled.

A potential drawback of parametric insurance is that it may result in overpayment or underpayment of a claim because it does not rely on an assessment the customer's actual loss amount.

80. Insurers may use historical insights generated by BDA to determine which claims are more likely to result in disputes or litigation and respond accordingly. For example, more controversial or complex claims can be escalated or assigned to senior claims handlers with relevant expertise and experience much earlier in the process.

81. Generally, specialised claims are at risk of being settled incorrectly when there is an over reliance on generic claims settlement models, which can have a negative effect on profitability or overall solvency. The use of BDA in claims processing could increase the

likelihood and impact of this risk. The adequacy of the actuarial reserve (total loss reserve) could be miscalculated, resulting in under-reserving and issues with paying claims. In addition to the direct harm to customers of being left with unpaid or improperly paid claims, insurers who do not properly pay out claims are likely to be exposed to reputational damage, which could lead to financial stability issues and/or an overall loss of confidence in the insurance sector. If claims are miscalculated on a large scale, insurers could also be exposed to legal actions from affected customer groups.

82. There is also a risk that claims settlement models used to assess individual claims could lead to (systematically) unjustified rejections of claims. The application of BDA could map policyholders into certain categories based on unsubstantiated associations or biases resulting in a lack of transparency and potential discrimination in the claims decision making process.

83. Claims optimisation or claims settlement optimisation is the practice of insurers using BDA to identify claimants who are likely to accept cash settlement amounts below the true value of their claims and then use that insight to negotiate an "ideal" or minimum claims settlement value. It enables insurers to settle claims based on customer vulnerability and other non-loss related factors rather than the actual quantifiable loss amount.[38] It is currently unclear how widespread the practice is. However, given that it essentially relies on the same approach and technology as price optimisation, it follows that insurers either have, or will shortly have, the capability to engage in this practice which could create a risk of unfair outcomes for customers.

3.3.3 Fraud detection

84. The insurance sector is constantly dealing with the impact of fraudulent claims. The costs associated with fraudulent losses and fraud detection tools are often passed on to customers.

Examples:

USA

Insurance industry estimates generally put fraud at about 10 percent of property and casualty insurers' incurred losses and loss adjustment expenses each year, although the figure can fluctuate based on line of business, economic conditions and other factors.[39] Using this measure, over the five-year period from 2013 to 2017, property and casualty fraud amounted to about $30 billion each year.[40]

Australia

[38]Duncan Minty, 7 reasons why claims optimisation needs to be seen as a failure (22 March 218) https://ethicsandinsurance.info/2018/03/22/claims-optimisation-2/ .

[39]Estimate based on research conducted by the Battelle Seattle Research Center for the Insurance Information Institute in 1992 (Fighting the Hidden Crime: A National Agenda to Combat Insurance Fraud. Insurance Information Institute, March 1992) and other industry reports (including Insurance Fraud, Renewing the Crusade, Conning, 2001).

[40]Insurance Information Institute, Background on: Insurance Fraud" https://www.iii.org/article/background-on-insurance-fraud .

The Insurance Council of Australia has stated that fraudulent claims cost insurers up to $2 billion annually.[41]

Germany

According to industry reports about nine percent of reported losses in motor, liability and property insurance show inconsistencies, meaning that the damage description does not match the picture of the damage, or the persons involved provide contradictory data or submit manipulated receipts. While not every inconsistent damage report is a case of insurance fraud, insurers are encouraged to examine inconsistent claims more closely. In 2017 property and casualty insurers estimated that insurance fraudsters caused overall losses of €4 - €5 billion a year.[42]

Switzerland

According to an industry study undertaken by the Swiss Insurance Association[43] in 2017 about ten percent of reported losses in general insurance are fraudulent.

85. Traditionally insurers have applied a combination of rule-based indicators and scoring models to identify claims with an increased likelihood of fraud, alongside random checks (eg internal audit) to manage fraud.[44]

86. The above methods have two major challenges. First, they rely on manual interventions which give rise to the risk of human error and unnecessarily long lead times from fraud detection to the settlement of claims. Second, they are also known for high false-positive rates, which could lead to adverse outcomes for customers.[45]

87. BDA, when used across the entire product and claims management lifecycle, can provide insurers with the ability to identify fraud in a more holistic and sophisticated manner through early warning triggers and predictive modelling. This would be particularly helpful in pre-emptively identifying and managing potential fraud perpetrated by criminal syndicates and other organised efforts.[46]

88. Early warning triggers and more efficient fraud detection capabilities enabled through the use of BDA could significantly reduce operational and claims costs, potentially resulting in lower insurance prices for customers. BDA could also be used by insurers to assist law enforcement agencies to identify, track and deal with perpetual offenders within the system.

Examples:

India

The Insurance Information Bureau of India[47] (IIB) offers an underwriting and claims search engine to all partner life insurers to enhance underwriting efficiency and mitigate fraud. IIB

[41] Chris Sheady, "Money for Nothing" at https://insuranceandrisk.com.au/article/money-for-nothing/ .
[42] https://www.gdv.de/de/themen/news/fast-jede-zehnte-schadenmeldung-mit-ungereimtheiten-11376.
[43] https://www.svv.ch/en .
[44] WNS, "WNS Decision Point: Insurance Fraud Detection and Prevention in the Era of Big Data – Curbing Fraud by Application of Advanced Analytics Across Policy Lifecycle" https://www.wnsdecisionpoint.com/Portals/0/Documents/Reports/PDFFiles/514/38/WNS%20Decision Point_Report_Fighting%20Insurance%20Fraud%20with%20Big%20Data%20Analytics.pdf at page 8.
[45] WNS Decision Point at page 8.
[46] https://www.eslinsurancemonitor.nsw.gov.au/sites/default/files/Big%20Data%20Occcasional%20Paper%20FINAL_0.pdf at pages 27 – 29.
[47] https://iib.gov.in/ .

is also working on a risk scoring and predictive model for life insurance that can be used to provide insights for underwriting and fraud detection. Certain life insurers are using credit scores/history in financial underwriting and consent based data authentication through partner systems. Geotagging and facial recognition technology is being used for pre-issue verification and fraud mitigation purposes.

South Africa

The South African Insurance Crime Bureau (SAICB), by accessing multiple data sources and through the use of advanced analytics, provides a collaboration platform for insurers, supervisors, law enforcement agencies and other stakeholders to help prevent, detect, track and prosecute fraud and related crimes in the non-life insurance sector.[48]

Hong Kong

The Hong Kong Federation of Insurers (HKFI) launched the Insurance Fraud Prevention Claims Database in 2018.[49] The system applies artificial intelligence and BDA technology, which assists claims officers to detect different types of suspicious claims or potential insurance fraud, particularly those involving multiple claims and syndicates. The system currently covers motor vehicle, health and personal accident insurance, and will extend its coverage to life and travel insurance in the next phase.

Singapore

Since January 2017, Singapore's General Insurance Association (GIA) has implemented a Fraud Management System that utilises AI and data analytics to scrutinise motor insurance claims.[50] This has allowed insurers to focus on the most suspicious cases and to investigate these claims in greater detail.

[48] https://www.saicb.co.za/ .
[49] https://insuranceasianews.com/hong-kong-launches-claims-fraud-database/ .
[50] https://www.ethozgroup.com/blog/rise-insurance-fraud-cases-implications/ .

4 Supervisory considerations

89. This paper has highlighted a number of potential benefits and risks associated with the use of BDA across the insurance product life cycle. Understanding these benefits and risks can help supervisors to develop appropriate and proportionate responses to rapid advancements in BDA enabling technologies and applications in a manner that ultimately promotes and encourages the consistent delivery of fair outcomes to customers.

Examples:

Australia

In June 2018 the New South Wales Insurance Monitor published a paper that explored issues around the use of BDA by general insurers. The paper considered the potential implications of this usage for market competition and consumers as well as for regulators and policymakers.[51]

Germany

In July 2018 the Bundesanstalt für Finanzdienstleistungsaufsicht (BaFin) published a report on Big Data and Artificial Intelligence, representing the outcomes of research done earlier with Partnerschaft Deutschland, the Fraunhofer Institute for Intelligent Analysis and Information Systems and the Boston Consulting Group.[52]

United States

The US Federal Insurance Office (FIO), in its 2017 Annual Report, published details of various technological innovations in the insurance sector including potential risks and benefits associated with the manner in which US insurers are applying BDA across the insurance product life cycle.[53] The report also contains examples of possible supervisory responses in this regard.

The Federal Advisory Committee on Insurance (FACI), which provides advice and recommendations to the FIO, will be conducting an in-depth examination of BDA through its subcommittee dedicated to the Availability of Insurance Products.[54] This subcommittee has a consumer focus and is expected to focus on topics such as transparency in the use of data and algorithms, price optimisation, availability in light of increased granularity in risk selection and pricing, and discriminatory impact.

90. The fairness outcomes envisaged in ICPs 18 and 19 must be achieved irrespective of the adoption of new technologies or other innovations by insurers, including the use of BDA. However the means by which these outcomes are achieved, and the appropriate supervisory responses, may differ depending on the manner in which the specific innovations are applied and the impact, likelihood and complexity of any new customer risks that are introduced as a result.

[51] https://www.eslinsurancemonitor.nsw.gov.au/sites/default/files/Big%20Data%20Occcasional%20Paper%20FINAL_0.pdf .
[52] https://www.bafin.de/SharedDocs/Downloads/EN/dl_bdai_studie_en.html .
[53] https://www.treasury.gov/initiatives/fio/reports-and-notices/Documents/2017_FIO_Annual_Report.pdf at pages 65 to 70.
[54] https://www.treasury.gov/initiatives/fio/Documents/June2019FACI_Minutes.pdf .

91. The previous Digitalisation Paper discussed in detail a number of key challenges and considerations for insurance supervisors in attempting to maintain a balanced approach to facilitating digital innovation while ensuring adequate levels of consumer protection.[55] This section is not intended to repeat those general observations, but rather highlights a few supplementary issues for supervisors to consider in responding specifically to the use of BDA in insurance as described in this paper.

4.1 Suitability, affordability and availability of insurance cover

92. As highlighted in section 3, the increasing use of BDA may enable insurers to segment customers into more granular categories for potentially differential treatment in respect of risk selection, marketing, underwriting, pricing and claims settlement. Access to bigger data sets including alternative data may provide deeper insights to allow more individual customisation than under traditional insurance (underwriting) practices. This can result in benefits and challenges of which supervisors should be aware.

93. Granular customisation may provide more product availability and accessibility, but some customers may find themselves not being offered specific types of cover at all, or face higher non-risk related individual premiums and potentially discriminatory claims settlement decisions. This could adversely impact the availability or affordability of insurance for certain segments of the population and may result in decreased levels of consumer confidence in the insurance sector.

94. The use of BDA may also result in consumers having fewer choices of providers due to network effects. Since BDA applications depend on masses of data and therefore require access to customers and their data, insurers can leverage their increasing BDA capabilities to control and monetise this data. Insurers with strong existing customer bases, and significant investment capability and knowledge resources can potentially create "winner takes all" network effects for one or a few companies (or platforms), which could result in fewer options for consumers at least in the mass market. This may also require supervisors to engage and collaborate with the relevant anti-competition agencies in their jurisdictions.

95. Increasingly in some, but not all, jurisdictions issues around access, inclusion and affordability are closely linked with the overall mandate of conduct supervisors and may require heightened focus as a result of insights gained through the use of BDA by insurers and supervisors themselves.

96. There may also be opportunities for supervisors to obtain insights from data collected and shared by insurers to assess the effectiveness of advice and suitability of products offered to customers. Supervisors could compare these insights with other metrics, such as complaints rates or product related key performance indicators to "back-test" the effectiveness of advice and product suitability after products have been sold.

Examples:

France

The collection of data and possible exclusion of customers is not a new phenomenon due to the emergence of BDA. However developments in BDA technology have amplified the issues tremendously due to the ability of insurers to now collect and process significantly larger amounts of data at much greater scale and speed. In France the "*loi EVIN n° 89-*

[55] IAIS Digitalisation Paper at pages 24 - 33.

1009" enacted in 1989, prohibits insurers from using customers' personal health data in their risk assessment activities when providing mandatory health insurance. This requirement is still relevant and applicable in a BDA context. However, BDA can enable insurers to deduce some of the health features of customers through the sourcing and processing of alternative data. These practices may therefore require specific regulatory and supervisory responses.

Netherlands

In the Netherlands a few new entrants focus their marketing and brand campaigns on specific target groups (eg high education, millennials and others) to attract potentially low risk customers.

To monitor the potential pressure on access to insurance in 2017 the Dutch Association of Insurers initiated a so-called solidarity monitor to analyse the development of the premium spread and the extent to which consumers remain insurable. This analysis will be conducted on a yearly basis to monitor developments.

European Union

EIOPA's recent thematic review on the use of BDA in motor and health insurance addressed, among other things, the topic of financial exclusion by analysing a number of indicators such as standard deviation from the average premium, consumer complaints, rejection rates and number of members in insurability schemes for high-risk consumers. Based on the information collected EIOPA observed that there is no evidence yet to indicate that a higher granularity of risk assessment factors excludes high risk consumers. However, while in the analysed sample, BDA tools such as AI or ML were found to already be actively used by 31% of European insurers across different areas of the insurance value chain, they expect the impact of BDA to increase in the years to come. The situation, therefore, needs to be closely monitored.

South Africa

The South African Financial Sector Conduct Authority (FSCA) has, in order to achieve its supervisory objective, an explicit legislative mandate to promote financial inclusion.[56] To help execute this mandate, the FSCA has established a dedicated market, customer and inclusion research unit supported by specialist data analytics tools and resources. The unit will draw on a variety of internal and external data sources to derive focused insights on customer behaviours, business model, product, distribution and servicing trends in lower income customer segments to ensure supervisory responses that appropriately promote inclusion and transformation across the financial sector, including insurance. These insights will be supplemented by analysis of insurer data submitted through statutory returns and thematic data requests designed for conduct risk monitoring purposes.[57]

4.2 Governance and oversight of algorithms

97. Subsection 2.2 of this paper highlights a number of concerns about the increasing complexity of algorithms and potential lack of transparency in their development and use. As a starting point to address these concerns, supervisors may consider the applicability of

[56] Section 58(1)(e) of the Financial Sector Regulation Act, No. 9 of 2017; http://www.treasury.gov.za/legislation/acts/2017/Act%209%20of%202017%20FinanSectorRegulation.pdf .

[57] https://www.fsca.co.za/Documents/FSCA_Strategy_2018.pdf at page 22.

existing requirements to the use of algorithms, including general principles relating to the management of risks taken by the insurer and the fair treatment of customers.

98. The simplicity, clarity and adequacy of communication and disclosures to customers in respect of the intended operation of algorithms, how their data will be used and any associated risks and avenues for recourse may also be important considerations.

99. Alongside existing requirements, some issues that may require additional consideration by supervisors in respect of the use of algorithms include the following:

- defining appropriate governance principles for the use of algorithms (eg adoption of codes of good practice and ethical use guidelines);
- measures implemented by insurers to ensure error and bias-free programming of algorithms to the extent reasonably possible; and
- the reliability of the algorithm, the accuracy and relevance of the specific data sets being used and their correlation with the specific customer outcomes that are intended to be achieved, for example, by:
    - using experts to validate the relevance of the variables used, eliminate those that are unnecessary or that could be sources of potential bias;
    - adopting more traditional parallel testing processes on portions of sample data; and
    - using standard/benchmark/independent datasets on algorithms to regularly monitor the algorithms for their continued relevance and absence of potential for unlawful discriminatory outcomes.

100. Depending on the complexity and opacity of some algorithm processes, supervisors may also want to consider taking steps either themselves or through reliance on other independent audit or validation parties to conduct sample verification and integrity checks both on the algorithm process itself as well as the outcome of the process in ensuring fair customer outcomes.

Examples:

France

The French Law for a Digital Republic,[58] enacted on 7 October 2016, introduces a principle of loyalty applicable to digital platforms. These are comprehensively and legally defined notably as “people who offer an online public communication service based on either ranking or referencing using computer algorithms”.

These platforms are subject to a duty of fair, clear and transparent disclosures to customers on a range of subjects, in particular the general terms and conditions of use of the intermediation service and the existence of a contractual/capital relationship or remuneration for their benefit. The law also regulates the disclosures that online platform operators must provide when offering pricing and other comparison services.

In addition, the law obliges the public administration to inform the persons concerned that an individual decision has been taken on the basis of an algorithm (via an explicit mention).

[58] https://www.lexology.com/library/detail.aspx?g=d2f9a06a-bd26-4a7a-9594-0ae639d51bd1 .

European Union

In April 2019, the European Commission published its Ethics Guidelines for Trustworthy Artificial Intelligence.[59] The Guidelines are based on the following key requirements:

- *Human agency and oversight*: AI systems should enable equitable societies by supporting human agency and fundamental rights, and not decrease, limit or misguide human autonomy.
- *Robustness and safety*: Trustworthy AI requires algorithms to be secure, reliable and robust enough to deal with errors or inconsistencies during all life cycle phases of AI systems.
- *Privacy and data governance*: Citizens should have full control over their own data, while data concerning them will not be used to harm or discriminate against them.
- *Transparency:* The traceability of AI systems should be ensured.
- *Diversity, non-discrimination and fairness:* AI systems should consider the whole range of human abilities, skills and requirements, and ensure accessibility.
- *Societal and environmental well-being*: AI systems should be used to enhance positive social change and enhance sustainability and ecological responsibility.
- *Accountability*: Mechanisms should be put in place to ensure responsibility and accountability for AI systems and their outcomes.

Additionally, as a follow up to its thematic review on the use of BDA in motor and health insurance, EIOPA has created a Consultative Expert Group on digital ethics in insurance.[60] The aim of this stakeholder group is to assist EIOPA in the development of a set of principles for digital responsibility in insurance, which intends to address, from a fairness and ethical perspective, the use of new business models, data sources and technologies in insurance, with a particular focus on pricing and underwriting. The stakeholder group may also assist EIOPA in developing a sound governance framework around the use of BDA tools such as AI and ML in insurance.

Singapore

On 12 November 2018, the MAS introduced a set of principles to promote fairness, ethics, accountability and transparency (FEAT) in the use of artificial intelligence and data analytics (AIDA) in finance.[61] This was co-created with the industry and incorporated feedback from financial institutions, industry associations, FinTech firms, technology providers and academia. Its four key tenets are:

- *Fairness:* AIDA-driven decisions have to be explainable, accurate and justifiable.

[59] https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai .
[60] https://eiopa.europa.eu/Pages/News/Call-for-expression-of-interest-EIOPA-Consultative-Expert-Group-on-digital-ethics.aspx .
[61] https://www.mas.gov.sg/publications/monographs-or-information-paper/2018/FEAT .

- *Ethics:* AIDA-driven decisions have to be aligned with the firm's existing ethical standards and minimally be held to the same standards as human driven decisions.

- *Accountability:* Financial institutions have to maintain clear responsibility for, and ownership of, their AIDA-driven decisions. For instance, they will need appropriate internal approving authorities for the use of AIDA, and data subjects should have access to channels to provide accurate information about themselves as well as to enquire or seek recourse for AIDA-driven decisions.

- *Transparency:* To increase public confidence, insurers must be transparent about the use of AIDA. This means proactively disclosing to customers as part of general communication, providing explanations of what the data is used for and its consequences for customers.

4.3 Third party risk management

101. There are various ways for insurers to organise the development and operation of digitalised processes. The development of algorithms and processing of data for BDA purposes can be done in-house by the insurer itself as part of its core business operations. However, third parties are often also used to provide ongoing support for various technical operational elements such as cloud services or other platforms, the design of algorithms and provision or sourcing of (alternative) data. Supervisors may want to consider how insurers manage potential customer risks that could arise as result of the sharing of their data with these third parties.

102. Supervisors may also consider the appropriateness of requiring insurers to extend their policies and procedures on the use of BDA to third party providers as part of their general governance arrangements for outsourcing where applicable.

103. Additionally, due to the specialised technical nature of third party services that may be provided to enable and support the use of BDA, there are sometimes limitations on the number of service providers available to provide these services in a particular jurisdiction or region. This could raise concerns for supervisors about the business continuity arrangements of those providers and the ability of insurers to provide uninterrupted service to customers as a result. More active supervisory coordination and cooperation within and beyond the jurisdiction or region may be necessary to facilitate information exchange and to strengthen supervisory oversight in this regard.

4.4 Issues around privacy, ownership and sources of data

104. The use of customer data and BDA raises issues around privacy, ownership and sources of data. These issues can have an impact on individual customers and insurers, as well as the insurance sector as a whole.

105. Although privacy protection issues, in most jurisdictions, do not fall within the scope of responsibility of the insurance supervisor but are instead left to a dedicated data protection agency, insurers and insurance supervisors need to be mindful of the privacy related implications of customer data usage. Standard 19.12 states that "[t]he supervisor requires insurers and intermediaries to have policies and procedures for the protection and use of information on customers".

106. Legal questions relating to the ownership of data could arise, for example, when a car's on-board system transfers data about driving behaviour to the manufacturer who provides the data to the insurer or when data from a wearable device is transmitted to a health insurer. A legal dispute could arise between the customer - who is the owner of the car or wearable device - and the insurer on the ownership of, and entitlement to, the data. Disputes of this nature could have a broader impact, such as resulting in reputational damage for the insurer and mistrust in the insurance sector as a whole.

107. In cases where alternative data derived from non-insurance contexts is used, conflicts may arise about the potential lack of consent to, and awareness of, the sharing of this data by the customer. Additionally, customers may be adversely impacted as a result of insurers making decisions that are based on alternative data that is incomplete or inaccurate. If customers are not aware of this type of data being used for insurance purposes, they may not be in a position, or have had the opportunity, to correct potential inaccuracies at the data source. This may require supervisors to collaborate with the relevant data protection agencies, other consumer protection forums and industry bodies in their respective jurisdictions to determine how best to mitigate any potential prejudice to consumers as a result of the use of this type of alternative data for insurance purposes.