# INSURABILITY
## AND ARTIFICIAL INTELLIGENCE

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### INSURABILITY AND RISK

Actuaries and risk professionals aim at understanding the risk affecting the policyholders and estimating accurately the premiums charged. In order to deal with insurability, actuaries use advanced actuarial risk models, data collection, and statistical methods while relying on regulations and market conditions continuously. The aim of this paper is to frame the concept of insurability when challenged by artificial intelligence (AI) tools, as discussed by the recently published paper '**AI and the opportunity and challenges it presents to insurability**'.

Insurability is conceptually defined by elements such as the understanding of the risks that affect the individuals that are to be insured, the premium level that corresponds to their risk level and the compensation they receive for the losses that might occur. A risk is insurable when it meets different criteria, such as being part of an insurance pool containing a **large number of similar exposure unit**, has a **definite and calculable loss**, is **affordable** in **premium** terms and it is **limited of catastrophically large losses**. However, insurability can always be threatened by moral hazard, adverse selection and insurance fraud.

### THE CONTEXT OF AI

Various research shows that AI has been so far largely positive for the society, reshaping the way financial institutions work, while focusing on data usage and process optimization. For example, M. Eling et. al. (2019)[1] show that most common forms of AI are applicable to image detection, fraud detection, claims management, natural language processing and predictive analytics using actuarial pricing models. >

The High-Level Expert Group, set up by the European Commission, states that:

*'Artificial intelligence (AI) refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals.'*

Software based AI systems commonly include applications under the name of machine learning. Where human intervention is needed, we call them **supervised learning techniques**. If no human intervention is required, they will be referred as **unsupervised learning** and **reinforced learning**. Hardware embedded AI systems are to be found in autonomous cars, robots or Internet-Of-Things applications.

AI tools achieve a certain degree of rationality by perceiving the environment they are part of, processing information and deciding the best course of action. AI has become an important tool in the value chain of insurance companies, specifically the AI systems that are implemented to execute specific tasks, helping customer interaction, product development, underwriting and claims management. Some examples of InsureTech companies include Lemonade, Wefox, among others, which use AI within the property and casualty insurance space, providing improved claims analysis and more dynamic and customer-centred product propositions. It is hoped that this article will contribute to an understanding of how the behaviour of AI systems can impact the insurability landscape.

## HOW AI CAN IMPACT INSURABILITY

Insurance companies assume to a certain extent that the risks they group are independent but similar, acting by the way of **law of large numbers**. We believe AI applications are capable to assess the risks with more accuracy on an individual level, assigning bespoke risk-based premiums. This insurability criteria will be challenged once AI will capture the dependency between risks better and will help insurers distribute the premium levels specifically to individual's needs.

The **affordability of the premium**, should, however, be kept. The perception of risk from the policyholders is totally different than from an insurer's perspective. When generalizing and pooling risk together the premium may not represent the underlying risk of the insured. AI can help in dealing with premium optimization problems. Policyholder's may face risks that are unbearable from the insurance value perspective. In such a case, a disproportionally high premium will be in place. This will challenge the AI systems by creating and isolating risks that are uninsurable.

Claim frequency and severity is another part where AI will add value through better predictions. The **loss definition** will change, once the AI systems will be able to predict claims and help design new insurance products. The products could be transactionally more efficient, more cost effective and cover risks that were previously uninsurable. However, an accurate loss prediction and definition might be at the expense of the policyholder, with insurance companies taking advantage when designing the policies and the risk cover in place. This will also help insurers transfer their risks more adequately when potential **large catastrophic losses** are identified.

With good intentions and a sustainable risk governance, insurers have the opportunity to create customer profiles using large amounts of data, identify insurance gaps, and provide adequate risk cover. They will have the opportunity to enrich previously available >

data with more society related insights, for example, by making use of natural language processing techniques or availability of web data (Common Crawl[2]). High costs of data administration and claims handling may also push them to adopt concepts like the Pan-European Personal Pension Product , reducing costs, providing a higher insurance access.

However, threats such as adverse selection, moral hazard and insurance fraud will remain.

## FURTHER ASPECTS TO CONSIDER

AI can pose some problems when it comes to risk exclusion. With a better risk differentiation, some insurers might tend to be selective in covering certain risks, socially excluding policyholders. Another important aspect of AI which has to be monitored is the transparency of the systems. The algorithms behind a new technology are not understood well from the beginning by all involved, creating the so called 'black-box' effect. To overcome this technical barrier of AI, to begin with, any financial institution should make use of validation techniques, document and benchmark the algorithms against traditional methods (see Henckaerts et. al. (2019)[3] and Molnar[4]). Actuaries should consider developing the models in a responsible manner, test them by avoiding methodological and technical errors and make sure they will not cause any harm to vulnerable groups, respecting social inclusion.

AI will also bring a new light on the organisational complexity of an insurance company. While the policyholder will benefit the reduced complexity and costs of an insurance product, the organisations may face different challenges. There will be a higher need of interdisciplinary work, covering key specialism functions from different departments at the same time. The skills of the actuaries, IT professionals, data scientists, underwriters etc., will be collectively involved. Effectively designing AI systems will help in reducing miscommunication between departments and the human-error factor when handling data-flows within the organisation.
This will help reduce existent operational risks and provide transparency on data usage. Undoubtedly, the failures of IT infrastructures, algorithmic liability or performance issues involving risk predictive algorithms will have to be considered.

With a cooperative and healthy governance landscape, up-to-date actuarial education and optimised business operations, AI will help improve insurability and provide new covers for risks that were previously uninsurable. <

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[1] M. Eling et. al., 'The impact of artificial intelligence along the insurance value chain and on the insurability of risks', 2019, The Geneva Papers on Risk and Insurance - Issues and Practice.

[2] Common Crawl, offers high-quality crawl data by collecting huge amounts of web data centrally and making it freely available to the public.

[3] Roel Henckaerts, Marie-Pier Cote, Katrien Antonio, Roel Verbelen, 2020, Boosting insights in insurance tariff plans with tree-based machine learning methods.

[4] Christoph Molnar, Interpretable Machine Learning.