

Blockchain in the Insurance Industry

Implications and Legal Boundaries

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Since the blockchain technology was introduced as the underlying architecture for the cryptocurrency Bitcoin in 2008, it has become a hot topic and subject to numerous studies not only in the payment industry but in almost every industry.¹

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In short, a blockchain is a distributed ledger to store static records and/or dynamic transaction data without the need of a central authority as the coordinator by using a consensus-based mechanism to check the validity of transactions and hash encryption to ensure unchangeability.² A blockchain's main characteristics are decentralised validation, redundancy, immutable storage and encryption.³ It is thus well suited for applications requiring transparency of records with permanent time and date stamp.⁴ This is why blockchain-applications are particularly interesting for the insurance industry. Even though the insurance industry lags behind the banking industry in terms of technology adaptation, it is uniquely positioned to benefit from blockchain technology.⁵ The utilisation of blockchain-applications could help an insurance undertaking addressing the competitive challenges resulting from poor customer engagement, limited growth in mature markets and the trends of digitisation.⁶

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¹ Adam-Kalfon/El Moutaouakil, Blockchain, a catalyst for new approaches in insurance, 2017, Introduction, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020.

² Lorenz et al, Blockchain in insurance – opportunity or threat?, 2016, S. 1, available at <https://www.mckinsey.com/~media/McKinsey/Industries/Financial%20Services/Our%20Insights/Blockchain%20in%20insurance%20opportunity%20or%20threat/Blockchain-in-insurance-opportunity-or-threat.ashx>, last visited 7.9.2020.

³ In more detail Köchling/Friehoff, Unlocking Blockchain Vol. 1, 2018, available at <https://www.recode.law/unlocking-blockchain-was-ist-eine-blockchain-und-wie-funktioniert-sie>, last visited 7.9.2020.

⁴ Lorenz et al, Blockchain in insurance – opportunity or threat?, 2016, S. 1, available at <https://www.mckinsey.com/~media/McKinsey/Industries/Financial%20Services/Our%20Insights/Blockchain%20in%20insurance%20opportunity%20or%20threat/Blockchain-in-insurance-opportunity-or-threat.ashx>, last visited 7.9.2020; in more detail Köchling/Friehoff, Unlocking Blockchain Vol. 1, 2018, available at <https://www.recode.law/unlocking-blockchain-was-ist-eine-blockchain-und-wie-funktioniert-sie>, last visited 7.9.2020.

⁵ Lorenz et al, Blockchain in insurance – opportunity or threat?, 2016, S. 1, available at <https://www.mckinsey.com/~media/McKinsey/Industries/Financial%20Services/Our%20Insights/Blockchain%20in%20insurance%20opportunity%20or%20threat/Blockchain-in-insurance-opportunity-or-threat.ashx>, last visited 7.9.2020.

⁶ Lorenz et al, Blockchain in insurance – opportunity or threat?, 2016, S. 2, available at <https://www.mckinsey.com/~media/McKinsey/Industries/Financial%20Services/Our%20Insights/Blockchain%20in%20insurance%20opportunity%20or%20threat/Blockchain-in-insurance-opportunity-or-threat.ashx>, last visited 7.9.2020.

The following article first highlights a few of the promising implications of blockchain technology in the insurance industry and its potential benefits. Then, the paper examines some of the regulatory boundaries.

I. Possible implications

Blockchain technology has a wide variety of use cases in insurance. These are too numerous to address all or even a majority of them, though. Hence, the article is confined to showcasing the possibilities of

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- overhauling an insurance undertaking's data storage and exchange,
- improving customer experience and management,
- the introduction of new insurance products via smart contracts,
- the introduction of a new way of insurance based on a peer-2-peer system.

1. Better data storage and exchange

Since a wide variety of transactions and data can be stored, updated and monitored on a blockchain, it could be an alternative to the conventional insurance company's databases. In contrast to the currently prevailing "data silos", which have to be protected with elaborate infrastructures and firewalls, a company-, group- or corporation-wide blockchain could display all previously distributed stored data centrally, securely, unchangeably and visible to all network participants with the appropriate authorisation.⁷ The relevant data would be automatically available in the current version to every affiliated company in real-time. So, data updating and data exchange would not take days or weeks due to outdated data silo systems.

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On the one hand, this could prevent errors, unnecessary costs and delays in connection with verification, reconciliation and synchronisation of different databases. On the other hand, and possibly with the help of Smart Contracts⁸, processes that previously ran separately could be merged and automated throughout the company, group or corporation.⁹ Such procedures could be in the areas of contract conclusion, pricing, claims management¹⁰, customer checks in connection with know-your-customer and AML, fraud detection and reporting obligations to the regulatory authorities.

⁷ A detailed comparison between the blockchain technology and traditional IT-systems can be found in *Flasshoff et al*, *Distributed-Ledger-Technologie: Die Blockchain als Basis für die IT-Sicherheit*, 2018, available at https://www.bafin.de/SharedDocs/Veroeffentlichungen/DE/BaFinPerspektiven/2018/bp_18-1_Beitrag_Sandner.html, last visited 7.9.2020.

⁸ See in detail below.

⁹ *Flasshoff*, *Distributed-Ledger-Technologie: Die Blockchain als Basis für die IT-Sicherheit*, 2018, available at https://www.bafin.de/SharedDocs/Veroeffentlichungen/DE/BaFinPerspektiven/2018/bp_18-1_Beitrag_Sandner.html, last visited 7.9.2020.

¹⁰ See in detail below.

All in all, the utilisation of blockchain as an alternative to the current data silos might eventually not only result in a better run organisation but also massive cost reductions.¹¹

2. Better claims management through smart contracts

Depending on the blockchain's structure, it is possible to program applications such as smart contracts into the blockchain's code.¹² A smart contract can be described as a "contract" between two or more parties that is programmed electronically and executed automatically via its underlying blockchain in response to certain events, encoded in the smart contract's code.¹³ In other words, the smart contracts read incoming (external) data and act according to the programmed "if-then" function by executing or not executing the programmed consequence. The information data needed to trigger the automatic response can, for instance, be pushed onto the blockchain by trusted third parties via the Internet of Things through so-called oracles.¹⁴

In the context of insurance, smart contracts could be used to overhaul the customer experience and management in the claims settling process. For example, the claims management in home insurance currently is lengthy and complicated due to the need to involve many parties. In case of a flood causing damage to an insured person's house, for instance, the customer first needs to claim by submitting all of the documents required for settlement.¹⁵ Depending on the severity of the damage, this might be difficult to do since many records might be lost. However, even if the customer submits all necessary documents, a settlements process begins which takes several months or even years.¹⁶ First of all, after the handed in forms' first assessment, in many cases, experts must travel to the site to inspect the damage.¹⁷ Based on the expert's results, a second assessment occurs followed by negotiations of the settlement amount.¹⁸ The whole process up until the settlement requires input from various people slowing down the claims management and settlement process.¹⁹ When doing the claim settlement process based on a smart contract, this process can be

¹¹ *Flasshoff*, Distributed-Ledger-Technologie: Die Blockchain als Basis für die IT-Sicherheit, 2018, available at https://www.bafin.de/SharedDocs/Veroeffentlichungen/DE/BaFinPerspektiven/2018/bp_18-1_Beitrag_Sandner.html, last visited 7.9.2020.

¹² In detail *Köchling/Friehoff*, Unlocking Blockchain Vol. 2, 2019, available at <https://www.recode.law/unlocking-blockchain-vol-2-die-ethereum-blockchain>, last visited 7.9.2020.

¹³ *Adam-Kalfon/El Moutaouakil*, Blockchain, a catalyst for new approaches in insurance, 2017, S. 10, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020.

¹⁴ *Adam-Kalfon/El Moutaouakil*, Blockchain, a catalyst for new approaches in insurance, 2017, S. 10, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020.

¹⁵ *Adam-Kalfon/El Moutaouakil*, Blockchain, a catalyst for new approaches in insurance, 2017, S. 13, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020.

¹⁶ *Adam-Kalfon/El Moutaouakil*, Blockchain, a catalyst for new approaches in insurance, 2017, S. 13, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020.

¹⁷ *Adam-Kalfon/El Moutaouakil*, Blockchain, a catalyst for new approaches in insurance, 2017, S. 13, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020.

¹⁸ *Adam-Kalfon/El Moutaouakil*, Blockchain, a catalyst for new approaches in insurance, 2017, S. 13, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020.

¹⁹ *Adam-Kalfon/El Moutaouakil*, Blockchain, a catalyst for new approaches in insurance, 2017, S. 13, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020.

completed in less than a week.²⁰ A weather oracle such as a GPS device determining whether the insured house is located in the affected area sends information on the weather conditions to the blockchain in real-time.²¹ The smart contracts read the data and settlement then is triggered automatically if the requirements of the smart contract are met.²² By introducing insurance contracts based on smart contracts, thus, an insurer can tackle its problems to poor customer engagement which then can also lead to cost reductions resulting from streamlined processes.

3. Index-based insurances

Besides, the utilisation of blockchain and smart contracts could make it possible for an insurer to expand their business into new business areas. For instance, the sharing economy has been increasing over the past years. Smart contracts offer the potential to accelerate the development of accompanying insurance coverage through on-demand or just-in-time insurances.²³ The insurance policy for a shared device, a claim and the settlement could be automatically activated if the shared asset carried an IoT sensor that can detect and share the information on the start or end of usage or any other relevant event triggering coverage, claim or settlement.²⁴

Apart from on-demand insurances, blockchain technology could enable insurance undertakings to offer index-based insurances. Index-based insurance is insurance-linked to an underlying index such as rainfall, temperature, humidity or crop yield.²⁵ Index-based insurances are not entirely new. Insurance companies have already tried to tackle the problem of a high percentage of people in rural regions in developing countries being uninsured with such products.²⁶ The idea was that by linking the insurance to an index, fewer intermediaries would be needed to be involved, which would make offering insurance in rural regions profitable. However, putting in place such a product remained too costly and

²⁰ Adam-Kalfon/El Moutaouakil, Blockchain, a catalyst for new approaches in insurance, 2017, S. 13, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020.

²¹ Adam-Kalfon/El Moutaouakil, Blockchain, a catalyst for new approaches in insurance, 2017, S. 13; available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020; McWaters et.al., The future of financial infrastructure: an ambitions look at how blockchain can reshape financial services, 2016, S. 61, available at http://www3.weforum.org/docs/WEF_The_future_of_financial_infrastructure.pdf, last visited 7.9.2020.

²² Adam-Kalfon/El Moutaouakil, Blockchain, a catalyst for new approaches in insurance, 2017, S. 13, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020; McWaters et al, The future of financial infrastructure: an ambitions look at how blockchain can reshape financial services, 2016, S. 61, available at http://www3.weforum.org/docs/WEF_The_future_of_financial_infrastructure.pdf, last visited 7.9.2020.

²³ Adam-Kalfon/El Moutaouakil, Blockchain, a catalyst for new approaches in insurance, 2017, S. 10, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020.

²⁴ Adam-Kalfon/El Moutaouakil, Blockchain, a catalyst for new approaches in insurance, 2017, S. 10, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020.

²⁵ Adam-Kalfon/El Moutaouakil, Blockchain, a catalyst for new approaches in insurance, 2017, S. 16, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020; Lorenz et al, Blockchain in insurance – opportunity or threat?, 2016, S. 4, available at <https://www.mckinsey.com/~media/McKinsey/Industries/Financial%20Services/Our%20Insights/Blockchain%20in%20insurance%20opportunity%20or%20threat/Blockchain-in-insurance-opportunity-or-threat.ashx>, last visited 7.9.2020.

²⁶ In a region such as Africa, for instance, the insurance penetration is at about 2 %; Adam-Kalfon/El Moutaouakil, Blockchain, a catalyst for new approaches in insurance, 2017, S. 16, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020.

complex to introduce on scale.²⁷ Not only are considerable resources and technical expertise needed to develop such a product, but also to put in place the necessary infrastructure to gather data of the insured properties.²⁸ By basing index-based insurance on smart contracts, however, the implementation might become profitable, since the insurance and its execution would be automated.²⁹

A smart contract between the insurer and the farmer, for instance, might stipulate that payment of the insured sum is due after 30 days of draught.³⁰ The needed information would be provided by reliable external sources such as weather stations and payments would be triggered in case of 30 days without rain without a claim or the involvement of experts to assess on the side.³¹ Thereby not only the insurance penetration in rural regions in developing countries could be raised but also alternative agricultural insurance for mature markets introduced. Eventually, this could result in an insurer securing new market segments and streams of revenue which could help address the problem of stagnating revenues in mature markets.

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4. Peer-2-peer insurance

Blockchain technology not only offers the opportunity to improve traditional insurance business and operations but also to further develop and enhance disruptive business models such as peer-2-peer insurance.³² Peer-2-peer insurance offers the possibility for interested parties to form groups to provide each other with insurance cover based on the (insurance) conditions set by the group.³³ Peer-2-peer insurance models are not entirely new, either. There are already some platform-providers for peer-2-peer insurance which try to address the general distrust of policyholders towards traditional insurance companies based on the sometimes complicated enforcement of an insurance claim and the difficult to understand calculations of the insurance conditions.³⁴ Until now, however, many peer-2-peer platform-

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²⁷ Adam-Kalfon/El Moutaouakil, Blockchain, a catalyst for new approaches in insurance, 2017, S. 16, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020.

²⁸ Adam-Kalfon/El Moutaouakil, Blockchain, a catalyst for new approaches in insurance, 2017, S. 16, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020.

²⁹ Adam-Kalfon/El Moutaouakil, Blockchain, a catalyst for new approaches in insurance, 2017, S. 16, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020; Lorenz et al, Blockchain in insurance – opportunity or threat?, 2016, S. 4, available at <https://www.mckinsey.com/~media/McKinsey/Industries/Financial%20Services/Our%20Insights/Blockchain%20in%20insurance%20opportunity%20or%20threat/Blockchain-in-insurance-opportunity-or-threat.ashx>, last visited 7.9.2020.

³⁰ Adam-Kalfon/El Moutaouakil, Blockchain, a catalyst for new approaches in insurance, 2017, S. 16, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020.

³¹ Adam-Kalfon/El Moutaouakil, Blockchain, a catalyst for new approaches in insurance, 2017, S. 16, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020.

³² Sarasola, So maybe you figured out what blockchain is – but what can you do with it?, 2018, S. 4.

³³ BaFin, Big data meets artificial intelligence, 2018, S. 134, available at https://www.bafin.de/SharedDocs/Downloads/EN/dl_bdai_studie_en.pdf?__blob=publicationFile&v=9, last visited 7.9.2020.

³⁴ BaFin, Big data meets artificial intelligence, 2018, S. 134, available at https://www.bafin.de/SharedDocs/Downloads/EN/dl_bdai_studie_en.pdf?__blob=publicationFile&v=9, last visited 7.9.2020.

operators have had problems scaling their business, as many potential customers have been reluctant to use them because of the risk of fraud.³⁵

This problem could potentially be solved by using a blockchain. A blockchain provides the opportunity to install a decentralised autonomous organisation (DAO).³⁶ A DAO is a "company" without a human management structure and an unchangeable set of rules of procedure defined in a smart contract.³⁷ This means that an algorithm in the sense of an autonomous agent, without human input, makes decisions based on the rules of procedure defined in the smart contract(s).³⁸ In the case of peer-2-peer insurance, the DAO could ensure that the rules of the procedure previously agreed between the participants and stored in one or more smart contract(s) is automatically executed as soon as they exist, without any individual participant being able to change the rules afterwards.³⁹ Due to that, the risk of fraud could mostly be eliminated, which might enable an undertaking to scale up a peer-2-peer insurance network.

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II. Regulatory Boundaries

When thinking about overhauling the data storage and exchange, improving the customer experience and management or the introduction of new insurance products via smart contracts, an insurance company must consider the fact that the insurance industry is highly regulated. The same applies when someone thinks about introducing or scaling up a peer-2-peer insurance platform. The reason for the insurance sector's intense regulation is that insurance is based on trust: customers expect insurers to be able to honour contractually agreed payments at all times and often over a very long period. Therefore, there are usually specific statutory requirements regarding the insurance sector, which compliance is monitored by a federal supervisory agency.

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Under German law, for instance, everyone who conducts insurance business in Germany must be authorised by the Federal Financial Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht, BaFin) and continuously comply with all rules and regulations applicable to carrying out insurance business. Compliance is also closely monitored by BaFin. In case BaFin notices a breach of applicable regulations that might result in harm for the insured persons, BaFin can take action against the insurance undertaking and its representatives. As the ultima ratio, BaFin can forbid an undertaking to continue conducting insurance business in Germany and order it to unwind and liquidate.

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³⁵ *Sarasola*, So maybe you figured out what blockchain is – but what can you do with it?, 2018, S. 4, available at <https://www.willistowerswatson.com/-/media/WTW/Insights/2018/06/emphasis-blockchain-use-in-insurance-from-theory-to-reality-wtw.pdf?modified=20180801185021>, last visited 7.9.2020.

³⁶ *Adam-Kalfon/El Moutaouakil*, Blockchain, a catalyst for new approaches in insurance, 2017, S. 14, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020.

³⁷ *Adam-Kalfon/El Moutaouakil*, Blockchain, a catalyst for new approaches in insurance, 2017, S. 14, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020; *Schiller*, Was ist eine DAO (Dezentrale Autonome Organisation)?, 2018.

³⁸ *Adam-Kalfon/El Moutaouakil*, Blockchain, a catalyst for new approaches in insurance, 2017, S. 14, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020.

³⁹ *Adam-Kalfon/El Moutaouakil*, Blockchain, a catalyst for new approaches in insurance, 2017, S. 14, available at https://www.pwc.ch/en/publications/2017/Xlos_Etude_Blockchain_UK_2017_Web.pdf, last visited 7.9.2020.

Concerning blockchain application in insurance, despite the generally high regulatory boundaries, there is no general restriction on its utilisation in insurance, though. However, the usage of blockchain in insurance might still be problematic for several reasons.

Some examples: In principle, blockchain applications are not limited to jurisdictional boundaries. Participants can, for instance, be located all around the globe. As a result, in case of conflicting legal regulations, it might be unclear which set of rules has to be applied in case of doubt.⁴⁰ This could potentially lead to circumvention of local authorities and supervisory and regulatory arbitrage.⁴¹ Even if a competent jurisdiction can be determined, depending on the applicable laws and regulations as well as the competent regulatory authority, the legal significance of a blockchain transaction has not yet been clarified. The same applies to the legal relevance of smart contracts.⁴² Under German law, for instance, the following are some of the legal questions arising from the unclarified significance of blockchain and smart contracts.

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First, it is highly disputed in the legal literature whether or not a smart contract can be qualified as a contract in a legal sense. Up until now, there is neither a court ruling on this matter nor a statement of BaFin. The majority of the legal literature, however, seems to deny that arguing that a smart contract cannot in itself contain the contractual rights of the parties but only executes that rights automatically. Following that argumentation, an insurer wishing to solely use a smart contract as an insurance contract without an additional agreement in a traditional sense faces the risk of a court qualifying the smart contract as a non legally binding contract. Since such a case would most likely harm the interests of an insured person, an insurance undertaking might face the risk of becoming subject to regulatory remedies if it introduces a blockchain application which legal compliance with applicable regulations is at stake.

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Second, another legal dispute evolves around the legal status of a DAO. Since the DAO in a peer-2-peer insurance network is meant to provide insurance coverage, peer-2-peer insurance groups could be subject to approval.⁴³ Following that, from a regulatory perspective, it is questionable whether the platform organiser or the participant who grant insurance cover to each other would be subject to regulation and supervision. The offering of a peer-2-peer insurance platform without a valid license might have massive consequences for the subject to authorisation. Under German law, the conduction of insurance business without a licence is a federal crime, which can result in imprisonment or hefty fines.

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⁴⁰ BaFin, Blockchain technology, 2017, available at

https://www.bafin.de/EN/Aufsicht/FinTech/Blockchain/blockchain_node_en.html, last visited at 7.9.2020.

⁴¹ BaFin, Big data meets artificial intelligence, 2018, S. 132, available at

https://www.bafin.de/SharedDocs/Downloads/EN/dl_bdai_studie_en.pdf?__blob=publicationFile&v=9, last visited 7.9.2020.

⁴² BaFin, Blockchain-Technologie, 2017, available at

https://www.bafin.de/EN/Aufsicht/FinTech/Blockchain/blockchain_node_en.html, last visited at 7.9.2020.

⁴³ BaFin, Big data meets artificial intelligence, 2018, S. 132, available at

https://www.bafin.de/SharedDocs/Downloads/EN/dl_bdai_studie_en.pdf?__blob=publicationFile&v=9, last visited 7.9.2020.

Lastly, under German law, it might also be problematic to use a company, group or corporation-wide blockchain for data management purposes. The reason why is that insurance undertakings wanting to offer more than one insurance division must organise them in different companies which must conduct insurance business separately from each other. Hence, it might be problematic if the whole corporation used the same blockchain.

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III. Outlook

All in all, the mentioned examples of possible blockchain application in insurance show that the insurance industry could benefit significantly from the blockchain technology. Not only can it help incumbent insurance undertakings addressing the competitive challenges resulting from poor customer engagement, limited growth in mature markets and the trends of digitisation. There is also the chance that with insurance concepts based on blockchain and smart contracts, new insurance models can be offered to up until now uninsured. By all this potential, it is, however, crucial for an undertaking to consider the regulatory boundaries when evaluating the introduction of blockchain implication. This is especially true since the legal significance of blockchain and its possible use cases is still in doubt.

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