

Leveraging Blockchain to Transform Insurance Industry

The industry impact of blockchain technology and emerging scope of insurance applications



Contents

1	Introduction	3
2	Beyond the Hype: The Case for Blockchain	4
3	How Blockchain Can Transform the Industry	6
	3.1. Employing Blockchain in Insurance value chain	6
	3.2. Applications for Enabling Insurance Innovation	10
4	Insurance Blockchain: A Look Ahead	13
	References	14

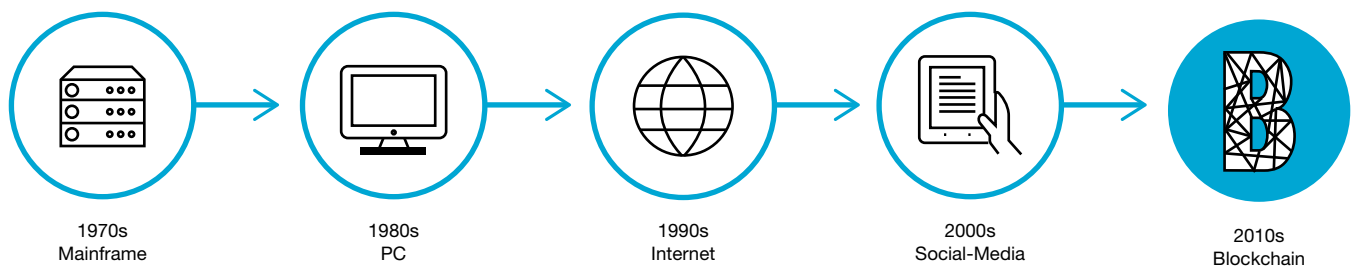
1 Introduction

‘The revolution will not be televised. It will be cryptographically time stamped on the block chain.’

(Frisby in Kastelein 2016)

The dawn of the 21st century witnessed the emergence of the digital era and a continuous stream of technology innovations, year after year. Some of these innovations were ground breaking; they transformed the way people do business and interact with one another socially. The most recent of these ground-breaking innovations is blockchain, a distributed ledger technology that is decentralized, tamper resistant, and transparent.

Exhibit 1: A new paradigm for computing



Source: ‘Blockchain-Powering the internet of value’, EVERY financial services, falls of 2015.

The banking and financial services industry has already proposed many use cases for this technology. Will it also have significant impact on the insurance industry? What will be the extent of this impact?

Blockchain has huge process-efficiency and cost-savings potential that spans the entire insurance value chain, including information gathering, underwriting, rating/pricing, billing, claims and regulation. In addition to improving these existing insurance operations, blockchain technology is inspiring industry innovations such as decentralized autonomous organizations, event-based insurance, index-based insurance, and peer-to-peer insurance.

This whitepaper explores the insurance business processes and operations that blockchain applications may impact, now and in the future.



2 Beyond the Hype: The Case for Blockchain



In 2008 a whitepaper with Satoshi Nakamoto named as the author described bitcoin, believed to be the first form of crypto currency, which employed a technology called blockchain for its payment system. While bitcoin currency has encountered a number of social and financial challenges, interest in the associated blockchain technology grew as other applications for this decentralized, tamper-resistant, transparent distribution system were identified.

Many technology giants started experimenting with this publically accessible, 'open' technology. Industry consortiums, forums among IT-industry leaders and governments, technology-company investments and a significant number of new blockchain company start-ups arose from this initial bitcoin-blockchain hype.

Exhibit 2 lists some of the more significant events and event participants in blockchain 'post-hype' innovation, application development and pilot programs.

Exhibit 2: Blockchain Post-Hype Progress—Events and Participants

DATE	EVENT	PURPOSE	PARTICIPANTS
August 4, 2015	American Innovation Road show.	U.S. State Department recommended development of blockchain at this event, headed by U.S. Secretary of State John Kerry.	U.S. State Department in association with Southeast Asian Nations (ASEAN)
August 2015	Visa, Inc. sets up exclusive blockchain technology center in Bangalore, India.	This massive technology center is currently being set up to house the team that will be working on the digital currency sector.	Visa, Inc.
September 29, 2015	R3 Blockchain project: Project kick-off connecting more than 40 global banks on private Ethereum Blockchain via the Microsoft Azure cloud.	<p>Project Scope: The project is to study and engineer advanced state-of-the-art commercial blockchain applications and standards for the financial industry.</p> <p>Project Objectives: Increase security, reliability, performance, scalability and audit ability.</p>	<ol style="list-style-type: none"> 1. Barclays 2. BBVA 3. Commonwealth Bank of Australia 4. Credit Suisse 5. Goldman Sachs 6. J.P. Morgan 7. Royal Bank of Scotland 8. State Street 9. UBS 10. Bank of America 11. BNY Mellon 12. Mitsubishi UFJ Financial Group 13. Citi 14. Commerzbank 15. Deutsche Bank 16. HSBC 17. Morgan Stanley 18. National Australia Bank 19. Royal Bank of Canada 20. SEB 21. Societe Generale 22. Toronto-Dominion Bank

DATE	EVENT	PURPOSE	PARTICIPANTS
October, 2015	Nasdaq Linq: Nasdaq announced its initial clients for its new blockchain-enabled platform named Nasdaq Linq.	Nasdaq Linq is a blockchain ledger facilitating issuance, cataloging and recording of transfers of shares of privately-held companies.	<ol style="list-style-type: none"> 1. Chain.com 2. ChangeTip 3. PeerNova 4. Synack 5. Tango 6. Vera
January 2016	Australia's largest stock exchange, Australian Securities Exchange (ASX) bought a five percent stake (\$14.9 million) in a U.S. based firm. ASX decided to use blockchain for the Australian equity market.	<p>Venture Investment: ASX ventured in post-trade solution on private BLYTHE blockchain in partnership with Digital Asset Holding (DAH), a U.S.-based firm.</p> <p>Partnership Objectives: To examine BLYTHE's use as new clearing and settlement system that's faster and cheaper than the existing CHES system.</p>	ASX, Digital Asset Holding.
April 14, 2016	Blockchain & Distributed Ledger Conference	Sharing of findings and viewpoints on applications.	Over 40 leading financial institutions.
June 2016.	Various software-industry leaders commence research and establish exclusive blockchain thought leadership, teams and products.	To unleash and capture early blockchain market potential.	<ol style="list-style-type: none"> 1. Microsoft 2. Apple 3. Capgemini 4. INTEL 5. IBM 6. Accenture 7. TCS <p>220 blockchain startups as of June, 2016.</p>

Source: Capgemini Analysis

3 How Blockchain Can Transform the Industry

‘Between 2010 and 2015, a mere 13% of innovation investments by insurers were actually in insurance technology companies.’

(Kastelein 2016)

3.1. Employing Blockchain in Insurance value chain

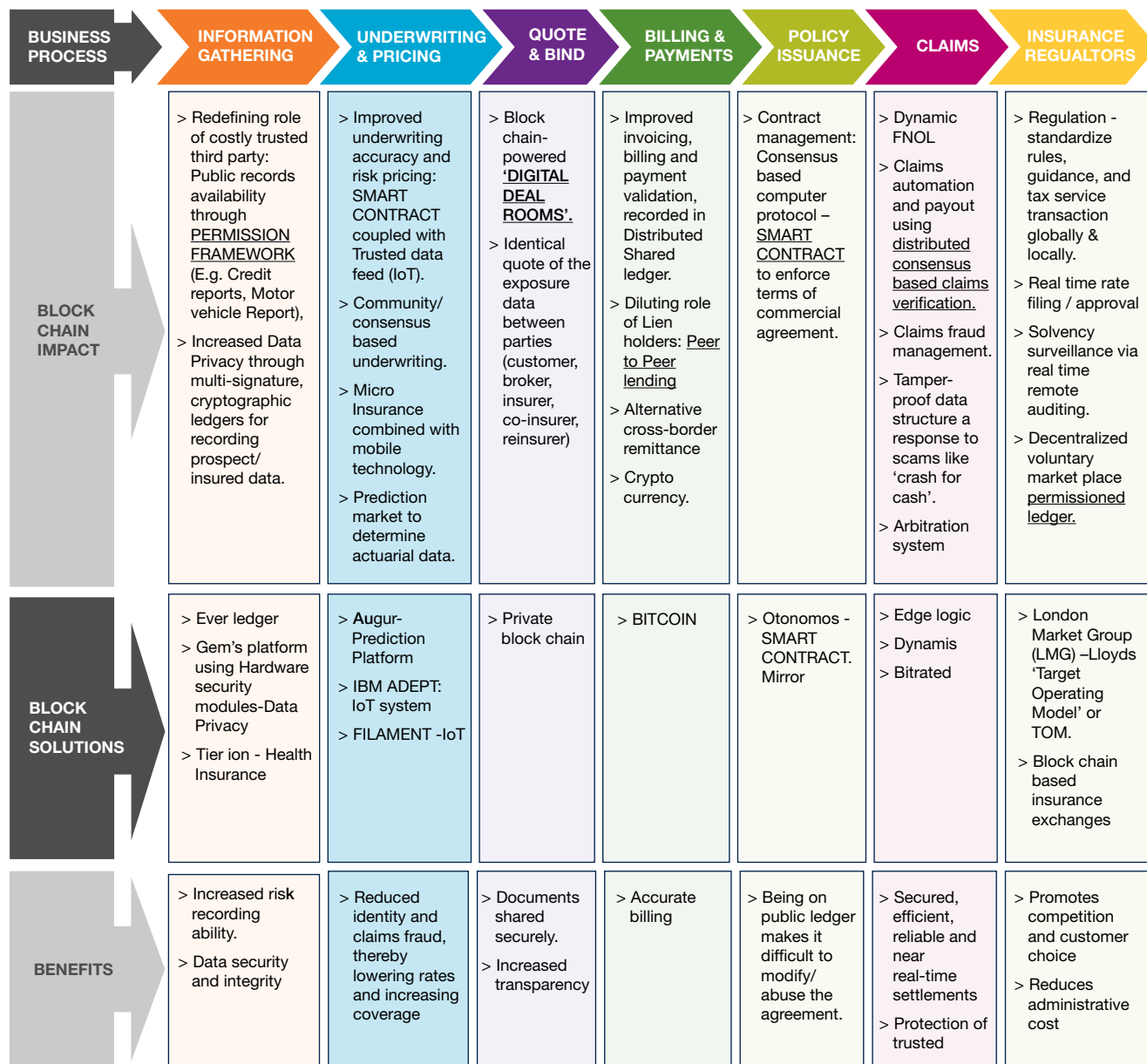
The insurance business has evolved, surviving several industry transformations. Blockchain technology is another driver of transformation; one with the potential to be among the leading digital-technology trends in the insurance industry. This technology has the potential to impact the entire insurance value chain end-to-end, including information collection, underwriting, rating, actuarial analysis, quoting, binding, billing, contract management, claims processing, distribution, policy administration and also regulation.

Each of these insurance sub-processes has faced its share of challenges. These include authenticity of prospect information; underwriting fraud (adverse selection, moral and morale hazards, underinsuring); underwriting inaccuracy due to lack of statistical data (especially in specialty insurance); actuarial/financial rate fluctuation; claims fraud; unfair claims settlement; increases in claims settlement cost; and customer retention. Blockchain proponents believe that applications of this technology could be the answer to these age-old industry challenges, as described in Exhibit 3.



² "Usage-Based Insurance and Telematics", National Association of Insurance Commissioners, October 8, 2015

Exhibit 3: Blockchain Applications Impact across the Insurance Value Chain



Source: Capgemini Analysis



3.1.1 Policy Administration Applications

Let's begin with the first process in the value chain—namely, information collection. Two major blockchain applications identified for this process are **'redefining role of expensive trusted third party information exchanges'** and **'increased authenticity/ transparency of information.'**

Prospect records (such as credit reports, motor vehicle records, patient records, etc.) stored in blockchain can be linked to insurance, financial and other stakeholders through blockchain's permissioned framework. This increases transparency and reduces/eliminates third-party dependency to issue authentic reports. **Blockchain Smart Contract**, when coupled with trusted data fed through the Internet of Things (IoT), can greatly improve underwriting accuracy and risk pricing, thereby reducing underwriting loss, industry-wide.

In underwriting, the next process in the value chain, blockchain's native, distributed-ledger functionality supports a **'consensus based underwriting'** application that can drastically reduce underwriting expenses. Consensus-based underwriting is analogous to crowd sourcing. This will involve networks of self-employed underwriters/loss adjusters selected through reputation and voting mechanisms. These underwriter networks will be enhanced by reviews and approval from peer policyholders serving the role of additional evaluators, further increasing underwriting accuracy.

Determination of likelihood of loss can be accomplished more precisely using a blockchain-based **'prediction market'** application. For example, by deploying prediction market in segments where there is a lack of actuarial prediction data, as in residual/involuntary markets, actuarial data can be directly collected from various pools of individuals. After the risk is underwritten and priced, blockchain-powered **'Online Digital Deal Rooms'** can securely share multiple insurance quotes to varied parties and bind deals (via permissioned ledgers). Furthermore, this ledger can vouch for accuracy of 'sold quotes' for invoicing, billing, and payment validations.

Blockchain will also pave the way to alternative modes of insurance financing such as peer-to-peer lending and international cross-border remittance. Layering among varied parties can be set up seamlessly and managed by smart contracts. New-business processing, insurance contracting and policy issuance tasks can also be simplified using self-executing smart contracts.

3.1.2 Claims Applications

An end-to-end **'claims blockchain solution'** will encompass dynamic first notice of loss (FNOL), automatic claims payout, consensus-based claims verification, complex claims processing, claims-fraud management and arbitration. The accurate determination of intensity of loss, the real-time capture of photos, and the quicker claims notification that can be provided using blockchain will improve the FNOL experience.

Claims-handling costs can be reduced using **'self-executing contract systems'**. These systems can, for example, perform automatic claims payouts to farmers that are triggered by weather reports generated by databases on blockchain.

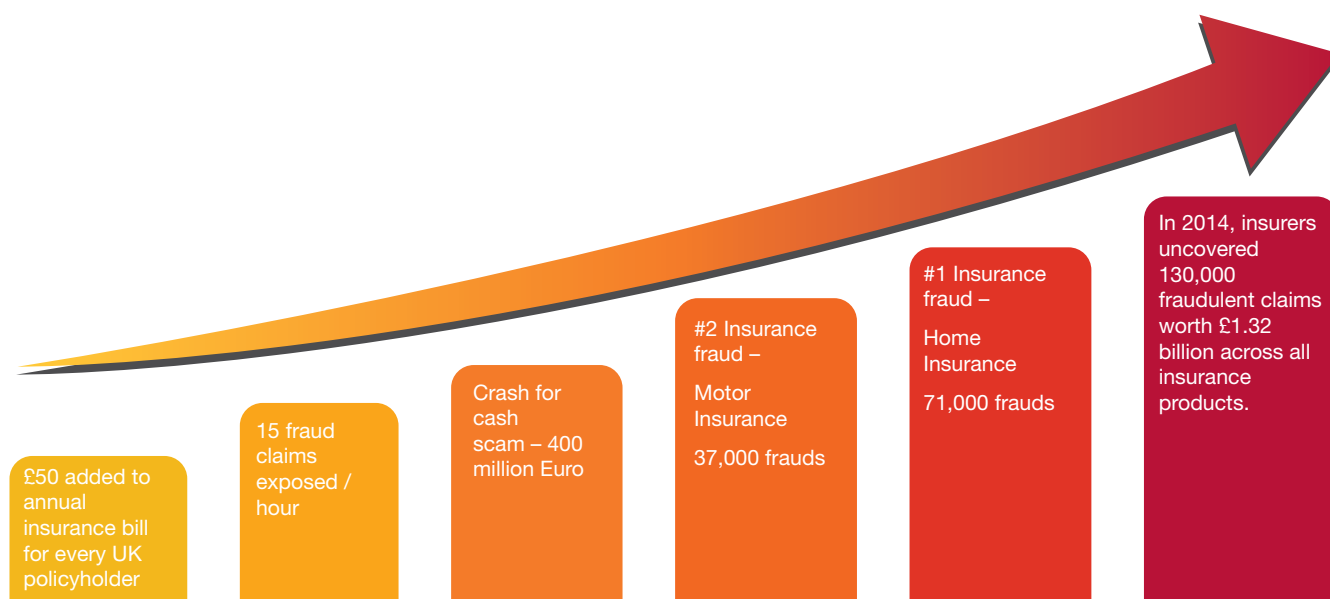
Claims settlement can become trouble-free, especially in commercial lines and reinsurance, using blockchain applications to accurately divide claims cost between commercial/reinsurance ceding and assuming parties by permanently recording details of claims. Blockchain applications for claims arbitration are already in development (e.g. Bitrated).

'65% of fraudulent insurance claims go undetected.'

(Everledger.io 2015)

Lastly, blockchain will also positively impact the deterrence of claims fraud, one of the insurance industry's top priorities, especially in the home-insurance and motor-insurance markets (Exhibit 4). Blockchain's public and tamper-proof data structure increases transparency, enabling insurers to collaborate to tackle this industry-wide challenge.

Exhibit 4: Snapshot of Insurance Fraud Occurrence in the UK



Source: 'Crash for Cash'

3.1.3 Regulatory Compliance Applications

Insurance regulators also have great hopes for blockchain, primarily in two key areas: market exchanges and solvency. The permissioned ledger functionality of blockchain can support '**decentralized market exchanges,**' which can promote consumer choice and competition. The Lloyds of London '**Target Operation Model**' (TOM) project has made significant progress in this direction.

Regulators are also researching the development of blockchain applications for auditing and monitoring insurer transactions. These can help provide real-time surveillance of insurer's solvency (re: European Union Solvency II Directive).

Exhibit 5: Leading Insurers and Their Blockchain Initiatives

INSURERS	BLOCKCHAIN INITIATIVES
Allianz	Piloted blockchain-based smart contract solution to automate catastrophe-swap transactions.
AXA Strategic Ventures	Strategic investments in Blockstream, a blockchain startup company. This is considered to be one of the largest investments by an insurer in emerging technology.
Generali Insurance	Italy's largest insurer, Generali Insurance invests in Blockchain start-ups.
John Hancock	Commenced several Blockchain proofs-of-concept.
Ping An Insurance Group	China's second biggest insurer, Ping An Insurance Group, joins R3 Blockchain consortium.
New York Life	Invested in Blockchain portfolio to explore and monitor Blockchain progress.

Source: Capgemini Analysis

'...either you understand that insurance is going to change, or the industry will disappear.'

(Greco in Trends 2016)

3.2. Applications for Enabling Insurance Innovation

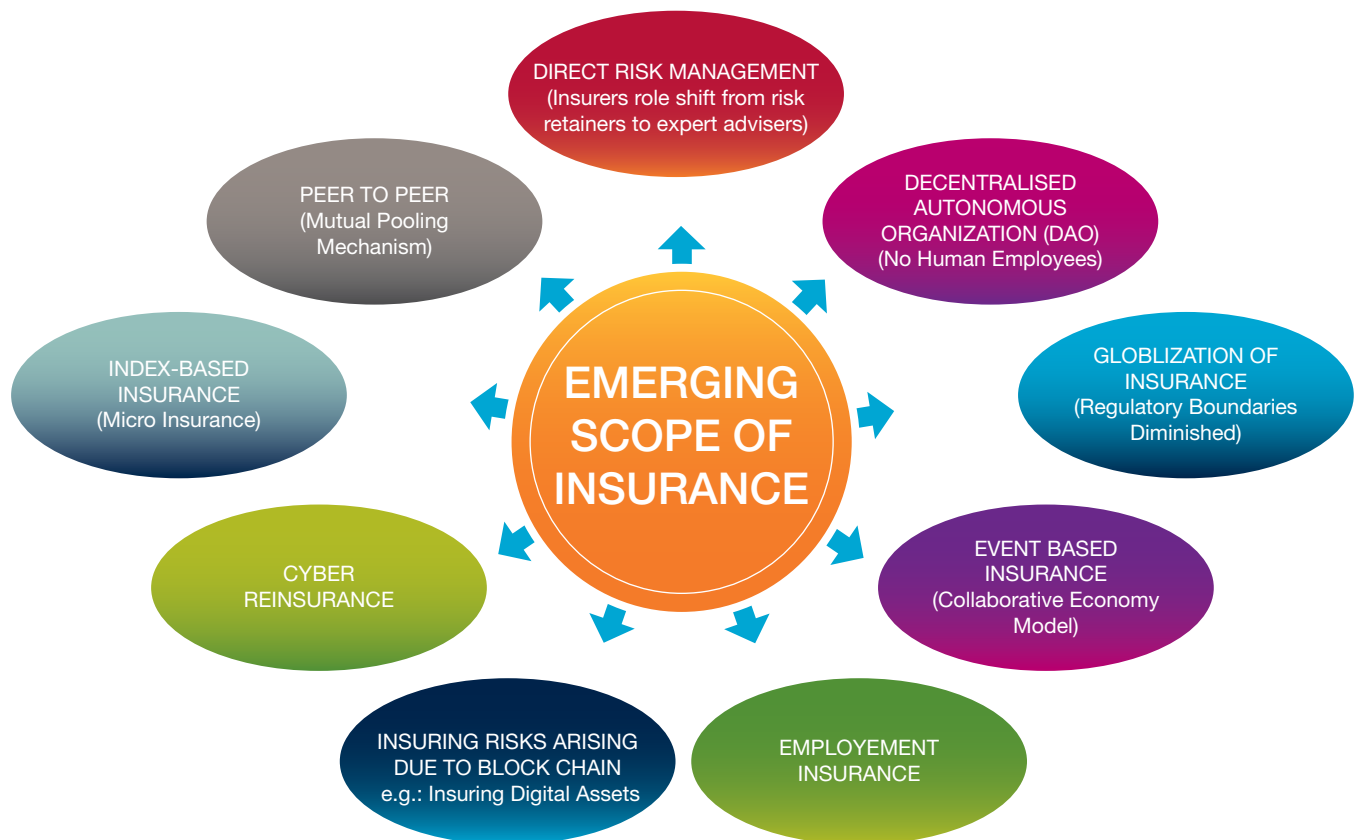
Although blockchain may have a significant impact on the traditional insurance industry, the real game-changer is how blockchain will be both a catalyst to emerging industry trends and inspire new insurance business. Some of the emerging global 'InsurTech' trends are event-based insurance, index-based insurance, peer-to-peer pooling, direct-risk management and regulatory-restriction revision (a.k.a. diminishing regulatory frontiers). Blockchain development will help the industry fast-forward these trends.

3.2.1 Insurance Opportunities in the Collaborative/Sharing Economy

Consider event-based insurance and on-demand insurance, which insure specific events or periods of risks (e.g. hourly car-insurance policies). The policies cover products and services that are shared among various parties during different time periods in the year. The market for these products includes businesses that operate in the growing collaborative economy, such as Uber rides and AirBnB stays. A public blockchain application providing peer-to-peer value exchanges and transparent recordings can improve customer engagement.

Another sharing-economy trend is index-based insurance (e.g. micro insurance). The insurers in this segment provide low-cost coverage, and their profits largely depend on cost efficiency and economy of scale. Blockchain can power several low-cost applications that can support this business. For example, connecting the vast micro-insurance population to the blockchain market place using inexpensive, low-function mobile phones can expand the existing distribution channels and provide greater economies of scale.

Exhibit 6: Insurance Innovations That Can Be Powered by Blockchain



Source: Capgemini Analysis

3.2.2 Expanding the Role of Insurers

Peer-to-peer insurance is another emerging market trend that can leverage traditional processes enabled by blockchain, since the technology has the potential to increase transparency and trust to customers since no third party authority controls it. This makes insurers autonomous and provides great opportunities for process automation.

A related trend is direct risk management, in which the traditional role of the insurer is reevaluated. There is a potential expansion of the current role of 'risk assumer' to 'expert adviser' through the provision of **Administrative Service Only (ASO)**. Peer-to-peer pooling groups formed via social media and participating via blockchain networks can retain risk among themselves.

Also worth noting is the diminishing insurance regulatory boundaries. Blockchain decentralized regulations and coverage enable business customizations across geopolitical boundaries, very quickly and seamlessly. This will pave the way to real-time, self-regulated insurers and a truly global insurance marketplace through the removal of regulatory barriers.

Other emerging InsurTech trends enabled by blockchain include cyber reinsurance, employment insurance and insuring risks.

3.2.3 Decentralized Autonomous Organizations: Non-Profit Insurers?

One of the extreme innovations which blockchain has given birth is **Decentralized Autonomous Organization (DAO)**. These organizations are proposed to operate on a mutual-insurance basis, where the policyholders will also be the shareholders of the corporation. They operate without the need for a single human employee, executing all business operations using blockchain-enabled automation and crowd-sourcing.

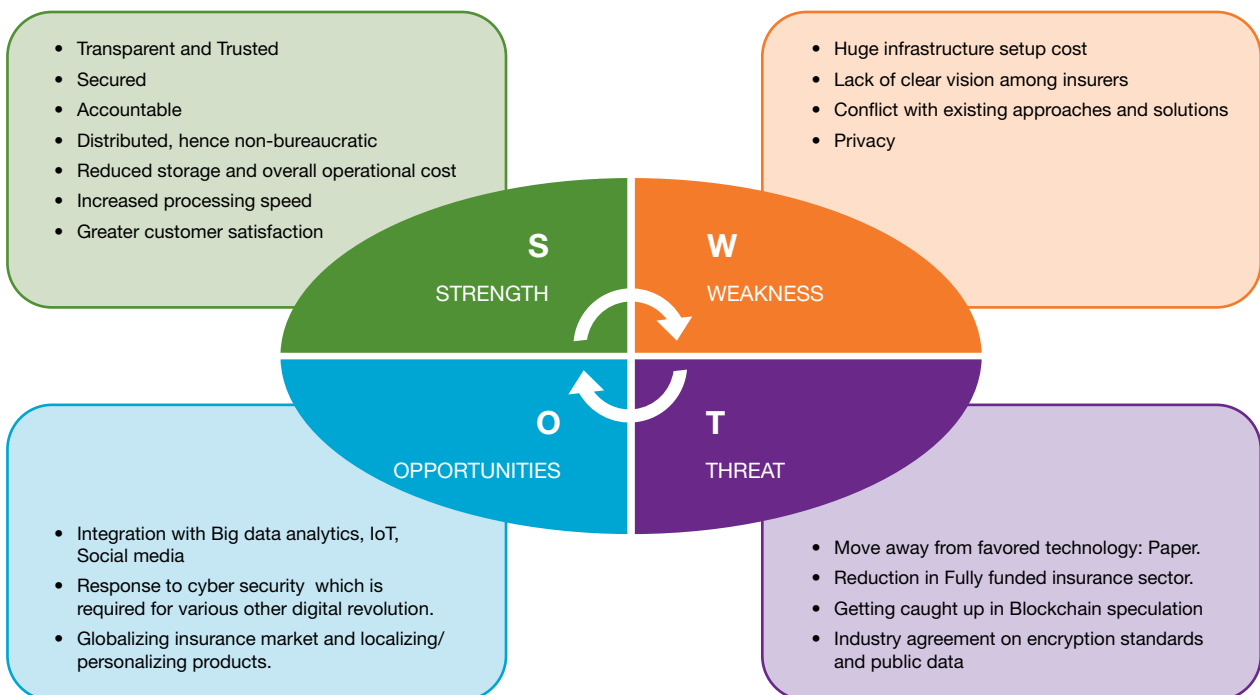
DAOs have great potential to decentralize the insurance industry and increase customer choice. Any organizational decision, such as utilization of capital, will be determined by a majority of the policyholders. Insurance policies will also be issued on a peer-to-peer basis. Consensus-based underwriting and claims pay-outs will involve participation of every peer policyholder.

This DAO business model will result in lower verification cost, better underwriting accuracy and reduced fraud rates. Also any insurer's surplus/float at year-end will be paid back to policyholders, potentially in the form of rebates on their upcoming premiums, etc. This model can make DAO insurers eligible for non-profit corporation status.

'According to a recent Computerworld survey, nine out of ten of respondents agree that blockchain will disrupt all areas of the financial chain.'

(D'Mello 2016)

Exhibit 7: Insurance Blockchain—A SWOT Analysis



Source: Capgemini Analysis

4 Insurance Blockchain: A Look Ahead

*'...blockchain adoption [will] happen in three phases: irrational exuberance, rational assessment and mainstream deployment...'
(Bennett 2016)*

The concept of blockchain has evolved from a payment platform for cyber currency to a technology that supports applications employing distributed ledgers that are decentralized, tamper resistant and transparent. It has recently experienced a meteoric rise in interest for being capable of building 'single source of truth' software applications.

Embraced by the financial services sector, the impact of blockchain is already significant and its practicality is now unchallenged. Insurance blockchain use cases have impressive innovation potential to relieve age-old industry pain-points and, more importantly, to open untapped opportunities for business growth.

However, many insurers and insurance regulators are still closely scrutinizing blockchain's relevancy, functionality and timelines for mainstream adoption. Even though several insurance proof-of-concepts and experiments are already underway, it may take five to ten years for full industry realization of blockchain's potential to power the insurance business.

Early adopters may encounter initial 'hiccups' such as technology skill limitations or regulatory standardization. Insurers, leading technology providers, InsurTech start-ups, regulators and other market participants need to stay focused and collaborative. This will enable not only analyzing existing business impact but also strategize the technology with vision for future as well.

Insurance regulators should analyze blockchain and build appropriate industry standards to mentor blockchain initiatives and innovation. This will also enable the insurance industry to gain early-adopter advantages, given the active and growing initiatives in the financial services sector. With proper and steady support, blockchain innovations will soon emerge as game-changing investments that support the advancement of insurance to the benefit of all industry constituencies.



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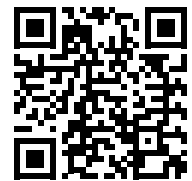


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