Quincy Analytics

CAPITALIZING ON BLOCKCHAIN IN INSURANCE

1/23/2018

Getting Economic Benefits Beyond the Hype

Blockchain has received considerable hype in the media. The groundbreaking, but often misunderstood, technology has suffered from some initial "sketchy" applications and bubble-like swings in the stock price of its most well-known application: "cryptocurrencies." Insurance professionals by nature are wary of any new technology that seems "cryptic" or implies great risk. However, looking at actual use cases and understanding the potential benefits of this powerful technology in insurance may encourage executives to re-think their initial blockchain skepticism. Beyond the security, speed and efficiency benefits of blockchain technology, *real savings*, ranging from 10-25% of transaction costs, should motivate insurers to seriously consider use of blockchains across the insurance value chain.

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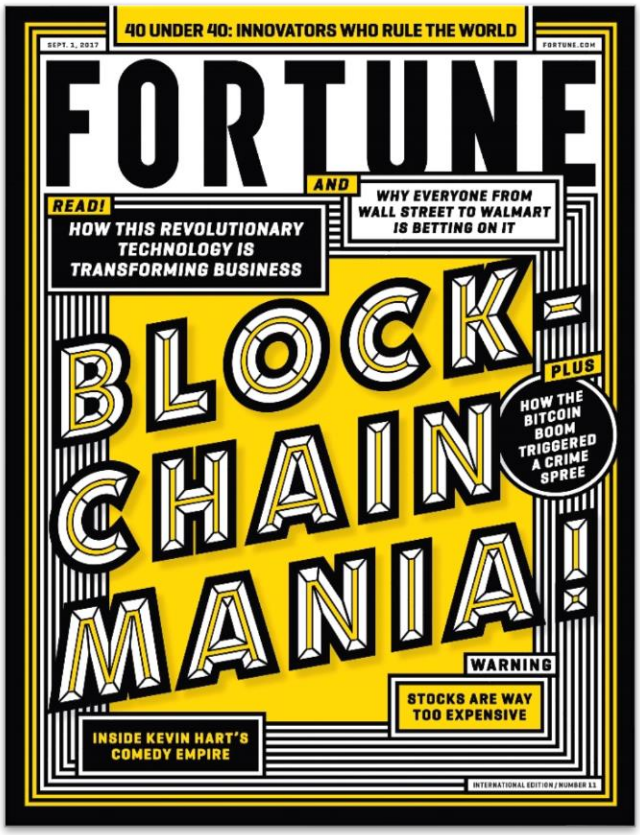
GETTING ECONOMIC BENEFITS BEYOND THE HYPE

The Blockchain Frenzy



***Fortune* Cover September 1, 2017**

This recent *Fortune* magazine cover epitomizes the frenzy around blockchain technology. The madness is compounded as thinly-capitalized, unknown, or troubled companies in everything from life sciences to iced tea, simply add "blockchain" to their names and see their stocks soar.[1] Even venerable, trusted brands such as Kodak are riding the hype, announcing its own cryptocurrency in January of 2018 and seeing its stock jump 60% overnight.

All of this only adds to skepticism – or downright mistrust – of blockchain technology. Add to this the new techno-speak, blockchain vernacular (distributed ledgers; miners/mining; nodes; cryptographic hashing; etc.), and the fundamental value of the technology goes from unfathomable to utterly brain-numbing.

First off, blockchain is *not* Bitcoin. Bitcoin (and other digital currencies) was just the first breakthrough application of blockchain technology. Unfortunately, initial association of Bitcoin with underworld money laundering and crime, married with the moniker "crypto"-currency, has led many to assume blockchain implies something cryptic, nefarious, or illegal. In fact, this couldn't be further from reality. "Crypto" in this case means highly encrypted information within the chain (NSA-level security). This is why sovereign countries (even the US with "FedCoin") exploring opportunities here prefer to call these "digital currencies" rather than cryptocurrencies.

So, what is blockchain technology and how might it be employed in insurance? It's best to start by understanding blockchain basics.

[1] In October of 2017, Bioptix (a $100mm revenue – and shrinking – "life sciences tools" company) acquired a tiny, two-week-old cryptocurrency mining asset, Kairos Global Technology, and promptly changed its name to Riot Blockchain (RIOT); they saw their stock increase by almost 675% overnight. Similarly, tiny beverage company Long Island Iced Tea (LTEA) changed its name in December, 2017 to Long Blockchain Corp. (with no apparent change in its business model or adoption of verifiable blockchain technology) and saw its market capitalization go from $7.4mm (and potential delisting) to almost $24mm overnight: an unexplainable jump of 219%!

Blockchain Basics

The allure of digital currencies as a starting point for application of blockchain technology is straightforward: it solved a financial and logistical problem. Traditionally, facilitating monetary transfers (such as international money wires) required a third party (i.e. a bank) who charged a transaction fee for the service and often took days to clear. Using blockchain technology (through a highly secure, encrypted, trusted, peer-to-peer (P2P), self-regulating network adhering to strict protocols) these transactions could be executed instantaneously without third-party fees. Bitcoin transactions promised to be faster and cheaper – and still highly secure.

But blockchain technology will be useful anywhere a third party needs to be involved to complete a transaction (and charges a fee), where data must be shared amongst multiple parties and is highly sensitive or confidential, where transaction or frictional costs (e.g. time) are high, and where transparency is paramount. At the heart of the technology is the "distributed ledger" (Figure 1): a common database of validated and encrypted transactions adhering to agreed upon common terms and rules (the protocol). Notice that one of the advantages of the distributed ledger is the elimination of the intermediary (the Clearing House) and any associated fees, time delays, or other inefficiencies.

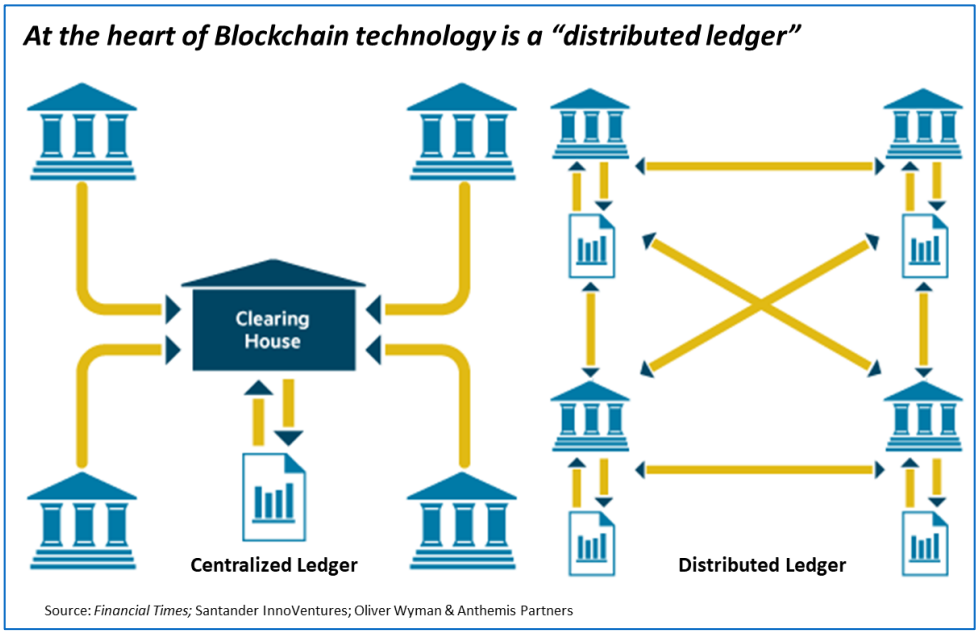


Figure 1: The Distributed Ledger

The distributed ledger allows for a central, validated data repository including all transactions and rules rather than each participant (e.g. carrier, reinsurer, broker, policyholder, etc.) maintaining their own database – which may or may not be fully coordinated and up-to-date. It is not uncommon in insurance today to rely on e-mail trails to confirm or validate transactions, endorsements, policyholder changes, etc. Worse still, many carriers are still locked in a paper-based world (scanned PDF documents, faxed certificates or proof of insurance, signature pages, etc.).

But, while the distributed ledger alone is a clear benefit to adoption of blockchain technology, some mistakenly equate the two. While the ledger is at the core, the blockchain process involves more than just a centralized, highly encrypted database. The blockchain process involves a series of data and transactional validations by the parties involved across the chain (these occur at what are called "nodes" or participating computers/servers, by participants called "miners" for digital currencies like Bitcoin).

The advantages of blockchain are really fourfold:

- **Shared Ledger:** the shared ledger functions as the *single* shared system of record across all parties in the chain. Since it is *the only* system of record it provides consensus, provenance, immutability, and finality. Additionally, it is also less vulnerable (multiple databases allow for multiple points of attack or failure), and because it is so highly encrypted, it is ultimately much more secure.

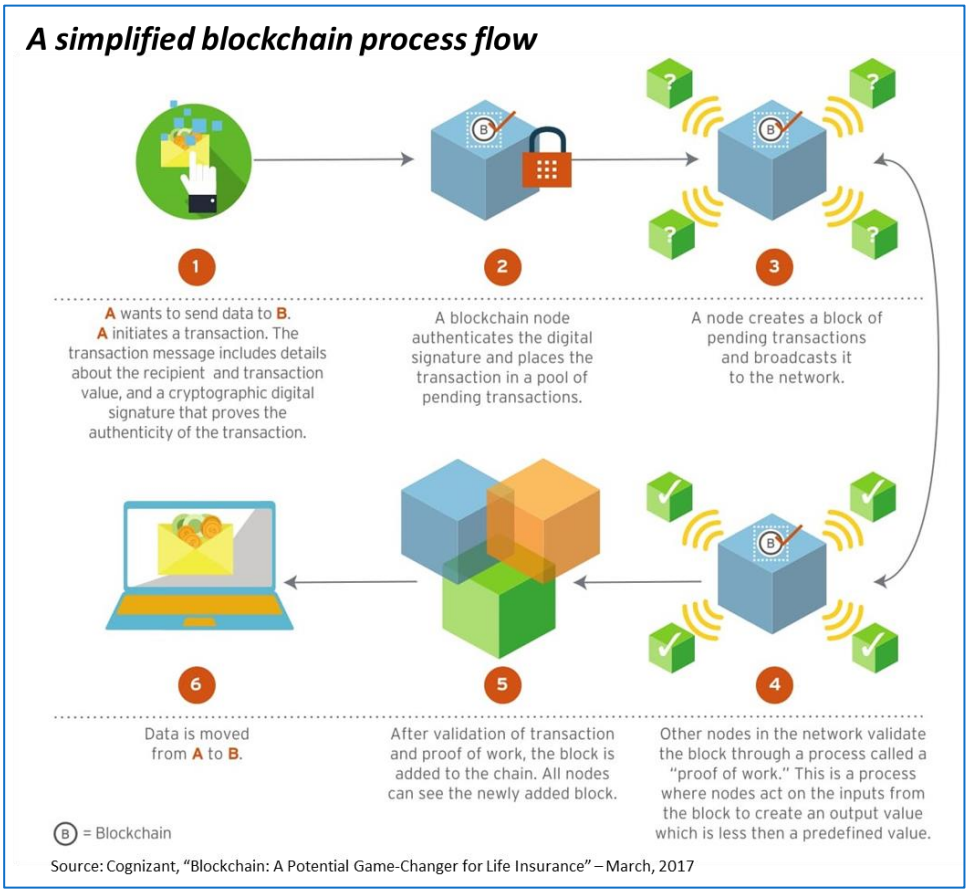


Figure 2: Completing the Blockchain

- **Smart Contracts:** business terms are imbedded in the transaction database (the ledger) and are executed instantly with transactions based on predetermined (computer-coded logic) and up-to-date protocols, rules, terms, and legal agreements.
- **Validation:** all transactions in the chain are verified, and all participants have real-time visibility to validated transactions (providing complete transparency).
- **Privacy:** through sophisticated encryption, all transactions and 3rd party information (e.g. medical records) are secure.

> *"Blockchain has the potential to improve the way insurers record risk, increasing the speed, accuracy and transparency of our processes."*
>
> - *Shirine Khoury-Haq, Lloyd's Director of Operations, November 2015*

Application of Blockchain in Insurance

With all these positives, it is no wonder that technophiles, InsurTech gurus, and blockchain proselytizers see applications all across the insurance value chain (Figure 3).

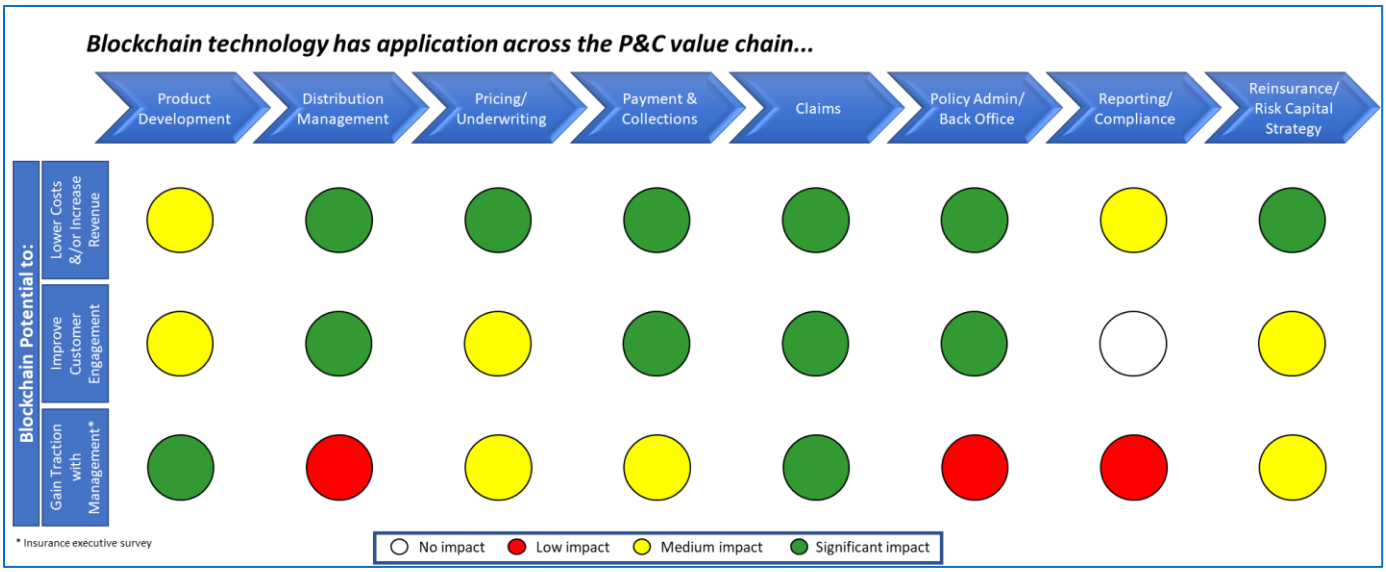


Figure 3: Potential Blockchain Application Across the P&C Value Chain

Some potential applications of blockchain technology will be large and broad, spanning multiple parts of the value chain and yielding substantial benefits in terms of revenue, cost savings, and efficiencies; others will be more arcane or niche with limited financial upside. Some elements of the value chain could also face disintermediation (elimination): e.g. brokers and law firms through smart contracts; underwriters through AI in P2P microinsurance applications.[2] A few examples of larger opportunities (either in terms of new product revenue or cost/efficiency savings or both) are:

- **Product Related:**
  - Complex, multi-party lines of business, e.g.
    - Surety
    - Wholesale and E&S
    - A&H and Worker's Compensation
  - Emerging markets (with sizable potential, versus pure "microinsurance")
    - In March of 2017, The Brookings Institute estimated that the global size of the "sharing economy" (e.g. Uber, Lyft, Airbnb, ZipCar, et al.) was ~$15bn and expected to reach over $330bn by 2025. Yet most users of shared economy products and services are vastly under- or uninsured. The opportunity for on-demand, usage-based insurance (UBI) products provides P&C companies with significant new revenue opportunities with a new demographic (shared economy consumers tend to be younger, e.g. "millennials") that is averse to traditional forms of insurance and carriers
- **Customer Relationship Management (CRM) Related:**
  - Improved customer engagement through streamlined onboarding (esp. commercial), real-time proof and certificates of insurance, streamlined policy administration, payments, and other customer service requests (e.g. loss runs)

[2] See Appendix for a glossary of InsurTech and Blockchain terms and abbreviations

- Use of smart contracts, distributed/shared database ledgers, and payment mechanisms (i.e. use of digital currency payments) for large, multinational risks

- **Claims Related:**
  - Management of 3rd party vendor contract terms, master service agreements, and vendor optimization/complexity reduction:
    - TPAs
    - Law firms
    - Non-legal vendors (e.g. adjusters, appraisers, engineering firms, etc.)
  - Fraud prevention:
    - Sharing of data among multiple third parties can prevent fraud before it happens, especially in unique/extraordinary circumstances (e.g. cat.)
    - Validation of provenance of valuable items helpful against high severity claims (esp. in high net worth market)

- **Other:**
  - Reinsurance: smart contracts and distributed ledgers can improve efficiency, compliance with terms, and remove unnecessary intermediaries (brokerage and clearing) to reduce expenses or erroneous payouts:
    - Multi-party treaties
    - Facultative programs
    - Layered programs
  - Compliance: explicit inclusion of regulators and reporting agencies as partners in the blockchain will reduce reporting costs, enhance trust, and improve compliance

While many of the use cases in the Appendix focus on relatively new technology start-ups, it is important to note that many established, mainstream insurers and reinsurers are overcoming initial skepticism and pursuing various applications of blockchain technology (Figure 4).

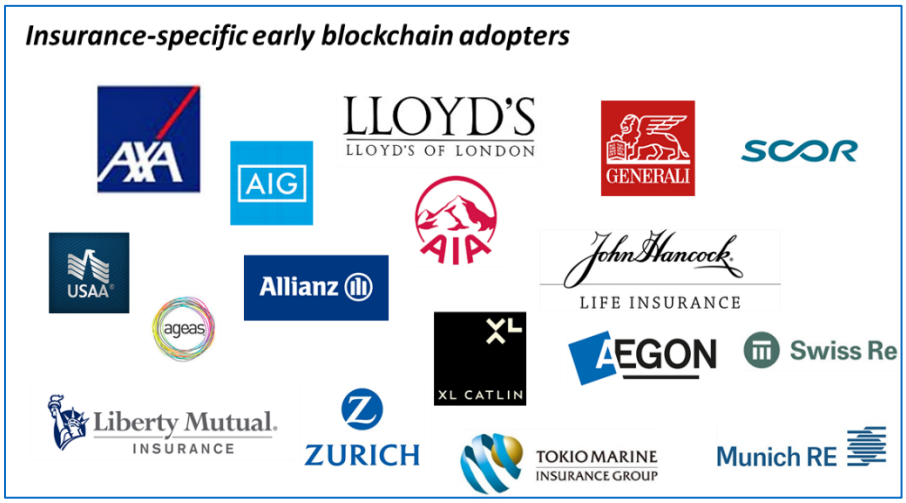


Figure 4: Mainstream Player Blockchain Experimentation

Admittedly, the mainstream players are in the early prototype or proof-of-concept stages of blockchain technology development and may be a few years from scalable implementation, but they all do share a common characteristic. None of these players are going it alone; they are

working in close collaboration: sometimes with each other (as in the case of the B3i[3] consortium) or with technology partners (e.g. AIG with IBM) or blockchain start-ups/experts

Notably absent in Figure 4 are the large brokerage houses (although Aon and Marsh are noted as recent adds to B3i). The slow involvement by the large commercial brokerages is somewhat perplexing. Unlike dot-com e-commerce disrupters who threatened to "disintermediate" the small commercial/personal lines *agent*, blockchain technology is aimed at the large commercial brokerages whose services (and fees/commissions) may be reduced or eliminated in an optimal blockchain "ecosystem." It would seem early adoption could help secure a meaningful and valuable role for the big brokers in new blockchain implementations lest they be cut out.

How Does Insurance Stack Up Against Comparable Industries?

Figure 5 shows the relative uptake of new technology in insurance ("InsurTech") relative to other financial services firms ("FinTech") and in blockchain specifically. Looking at all FinTech private (PE and VC) investment from 2016 to 2017, only 26% was in insurance (P&C and L-H), despite being just as large as the remaining financial services sectors. Looking just at InsurTech, the blockchain-specific portion of investment ranked sixth behind more popular (and perhaps tangible) areas like Big Data, IoT, AI and

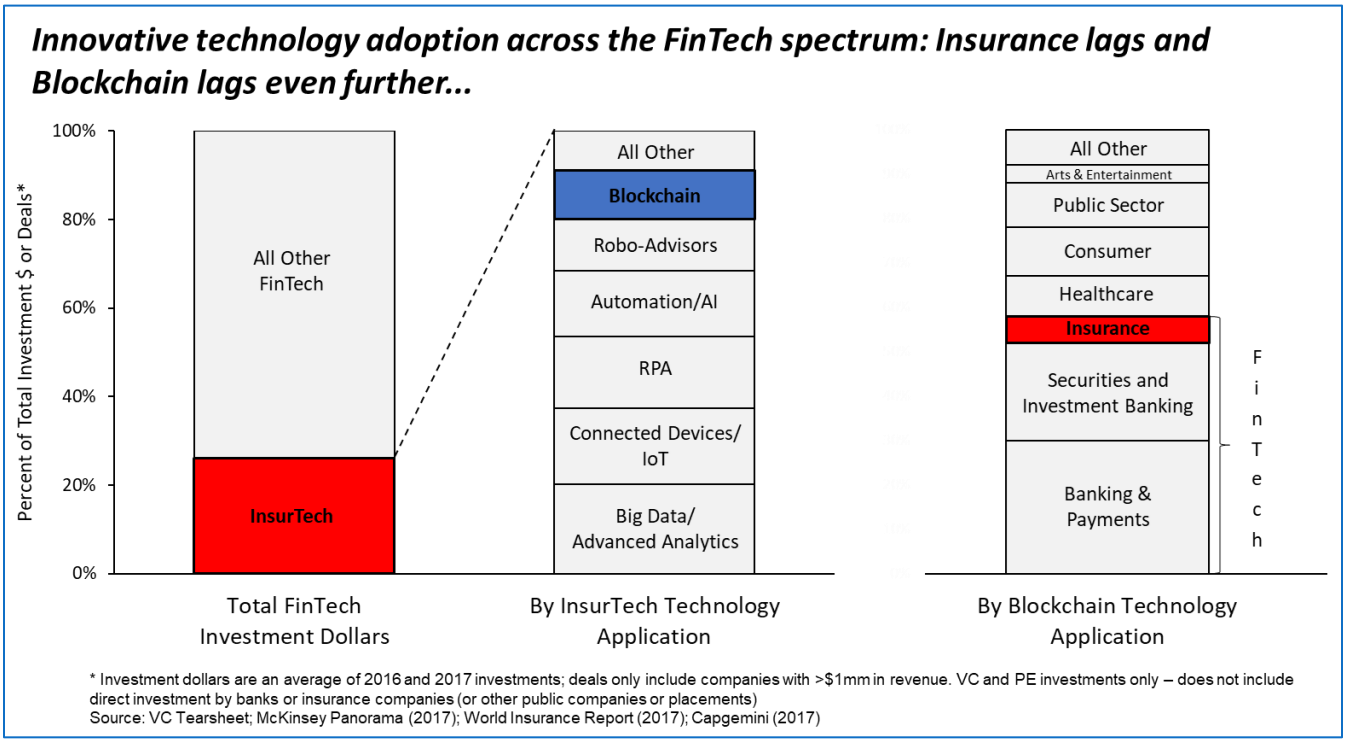


Figure 5: Insurance New Technology Investment and Blockchain

robotics.[4] Looking at a survey of all companies focused on blockchain with over $1mm in annual revenue

[3] The original 15 participants in the Blockchain Insurance Industry Initiative (B3i) include: Achmea; Aegon; Ageas; Allianz; Generali; Hannover Re; Liberty Mutual Insurance; Munich Re; RGA; SCOR; Sompo Japan Nipponkoa;, Swiss Re; Tokio Marine; XL Catlin; and Zurich. The consortium has since added 23 new members (including some brokerages) but this group is *not* considered "early adopters."

[4] See Appendix for a glossary of InsurTech and Blockchain terms and abbreviations

(the right hand panel of Figure 5), while FinTech accounts for almost half of startups focused on blockchain, insurance is a small component of that and, standalone, would rank 6th just ahead of the arts and entertainment industry.

So, why do insurers lag in a new technology space where the application is so uniquely and pervasively beneficial? While it would be easy to blame the natural risk aversion of insurance professionals, there are real challenges and logic to the slower uptake in insurance. These include:

- **Blockchain strategies are still a work in progress:**
  - A recent survey of insurance executives and managers by Cognizant showed that 48% of respondents cited a lack of use cases and 49% cited a lack of proof-of-concept demonstrating cost-benefits as the main reasons for not pursuing (or prioritizing) blockchain technology
- **There remains an absence of industry standards and an industry-specific platform:**
  - Despite the large-scale involvement in consortia like B3i (38 insurers, reinsurers and brokers at last count), standards still seem a long way off
  - Banks and others looking at digital currencies at least had a backbone and model (if imperfect) in cryptocurrency pioneers like Bitcoin and Ethereum
- **Lack of talent and technology know-how:**
  - Insurers interviewed noted a general lack of IT talent within the industry and a challenge attracting such talent into insurance
  - While carriers have been open to partnering with blockchain startups, many complain that these companies lack insurance-specific knowledge or are dismissive about the peculiarities, regulations, and other unique aspects of the insurance industry
- **Poor communication and collaboration:**
  - A willingness to collaborate was identified as vital by survey respondents, yet 55% of respondents in the Cognizant survey cited the lack of trust or the lack of connectivity of (legacy, internal) systems as a significant impediment
- **External and other barriers:**
  - Questions about scalability – many use cases thus far have been in limited or niche lines of business, applications, or market segments (e.g. cat bonds & swaps; crop insurance for small farmers; microinsurance)
  - Regulatory acceptance and impact – involving regulators early on will be *extremely* prudent to the future of blockchain success in insurance
  - Privacy and security concerns, despite "super-encryption," linger

The time horizon for extensive blockchain implementation in financial services is a long one. A recent survey by McKinsey and Company[5] of financial services executives (banking *and* insurance) suggested the

[5] "Blockchain Technology in the Insurance Sector", January 2017, presentation prepared for the Federal Advisory Committee on Insurance (FACI), US Treasury Department

time horizon for "commercial deployment at scale" of blockchain solutions in financial services could take until 2021. Figure 6 shows some of the headwinds and growing tailwinds that have affected blockchain uptake in the insurance industry.

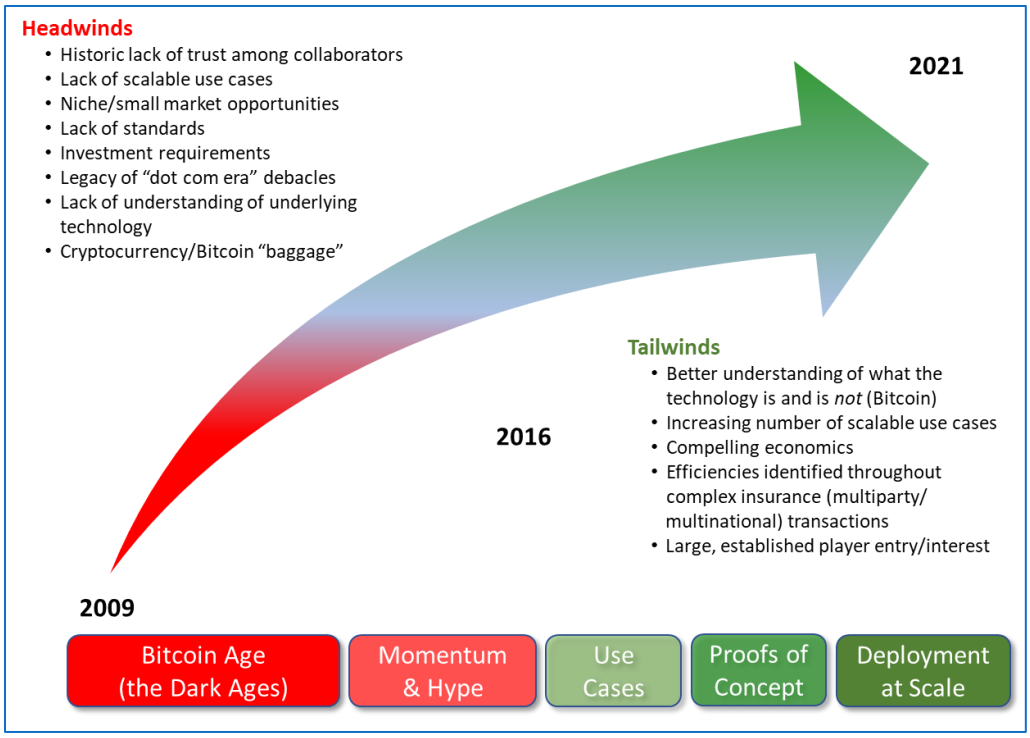


Figure 6: Time Horizon for Realizing Blockchain in Insurance

Some Compelling Preliminary Economics

While hard economic evidence for the potential of blockchain in insurance is scant, Figure 7 presents some preliminary analysis of the financial impact of blockchain in a few logical lines of business. While this is strictly modeled output and assumes full adoption, collaboration and compliance of all parties in the chain (perhaps an oversimplification), it is drawn from actual data from clients and voluntary industry participants (all disguised).

The participants providing financial data and guidance on use case assumptions and sensitivities include: a $15bn global reinsurer; a $1.5bn US wholesaler (subsidiary of a $30bn global P&C company); and a $200mm surety subsidiary of a large, multinational P&C company. In addition to providing their own internal financial information for modeling purposes, the management teams of these participants also provided expense data and assumptions used for likely participants (insureds, intermediaries/brokers, regulators, and other 3rd parties) in the blockchain.

The model *only* quantifies measurable economic benefit (e.g. fully loaded direct labor, fees/commissions, carrying costs, and other quantifiable direct "frictional" costs) erring intentionally on the side of conservatism. Other benefits such as ease of interaction, improved customer engagement, etc. were not estimated nor included in the financial analysis. The resulting modeled savings were considerable – ranging from a high of 23% in wholesale to at least 12% in surety.

Additionally, these are *annual* savings, meaning they are, in effect, a perpetuity. So, an *annual* savings of around $8mm (roughly the average in this sample) is an $80mm *present value* savings for a company with a 10% cost of capital. With an initial investment of say, $20mm, that works out to a net present value investment of just over $36mm and an internal rate of return (ROI) of about 59% assuming the

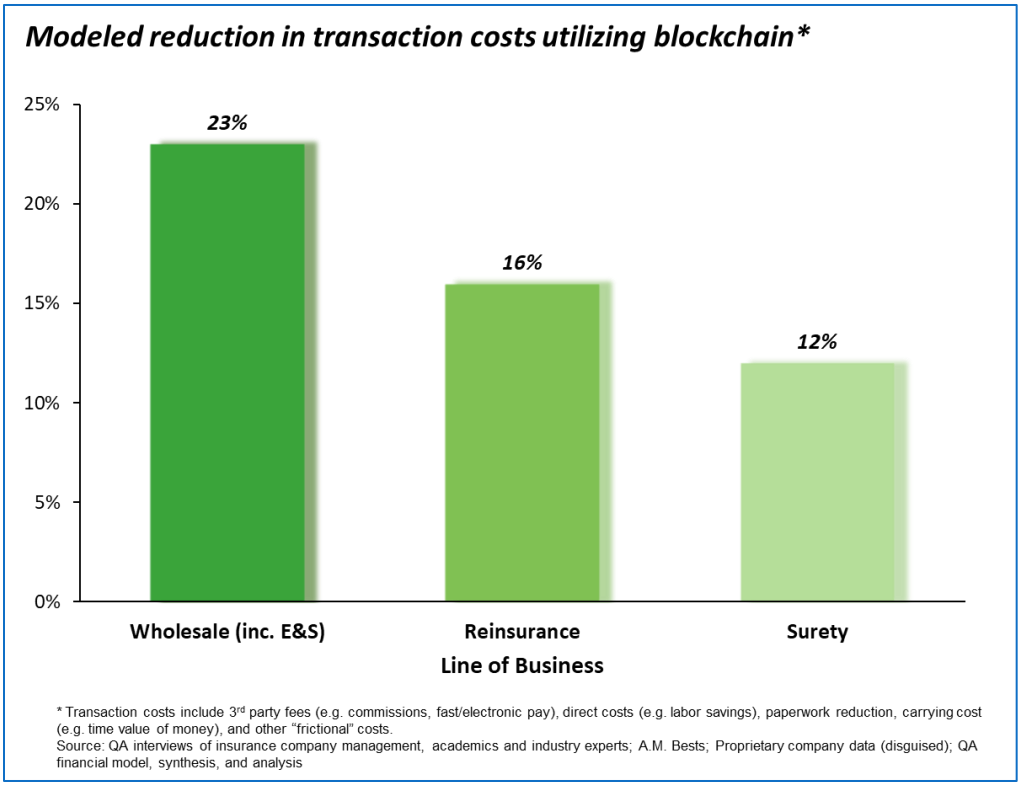


Figure 7: Blockchain Savings in Select P&C Insurance Lines of Business

blockchain technology begins paying benefits by year 4. Even if the upfront technology and other investment costs were double (or overran by 100%), the ROI (IRR) would be 26%.

The $20mm assumed investment is an estimate and careful scoping would need to be done upfront; however, it is an instructive number: if insurers take a "go-alone" approach rather than collaborating and partnering with existing technology developers (who likely already have proof-of-concept, if only in related or analogous industries), the development costs are apt to run much higher and potentially negate positive economic returns. Leveraging solid technology partners, investing prudently in promising start-ups with block-chain specific *experience* (not just brainpower), and only building from within when absolutely necessary will be the keys to success.

Just as with blockchain execution and use, collaboration and trust are paramount in development (with everyone from technology partners to regulators). While it may seem challenging with the disparate demographics, interests and motivations of these parties, differing levels of insurance-specific knowledge, and the seeming herculean challenge of "herding cats," insurers who overcome their own skepticism and risk-aversion and crack the code to collaboration could reap enormous benefits.

Key Takeaways: Putting it all Together

Blockchain technology in insurance is perhaps one of its most apt applications across all of FinTech. But to be successful insurers need to keep in mind three key things:

- **Don't fall for the hype; don't ignore the opportunity:**
  Blockchain is coming to the industry, if for no other reason than the ultimate cost-benefit will be so large. That said, insurers reasonably want to ensure they don't fall (again) for dot-com-esque hype and death knells of disintermediation, disruption, and being "blown to bits." While blockchain may not be the next coming of the internet, it will be an integral part of future insurance interactions and operations when deployed wisely, based on well thought out use cases, proofs-of-concept, and demonstrable ROIs.

- **The underpinning of successful blockchain development and deployment will be more about collaboration and trust than technology:**
  This will be true along the blockchain itself: all participants will have to trust in the ironclad cryptographic algorithms securing highly sensitive and confidential information being shared. Participants will have to trust the validators ("miners"), but also one another and put aside historical suspicions. This will include carriers, brokers, regulators, policyholders, anyone in the chain.

  But it will also call for trust and reliance on sometimes divergent views, approaches, and thinking in blockchain development. The staid insurance professional in suit and tie may actually have to listen and rely on the millennial in the flip-flops who has intimate knowledge of how to make blockchain technology work.

- **Proof-of-concept is prudent, but the biggest winners will be those who move to implementation and execution swiftly:**
  Insurers must not succumb to "analysis paralysis" while simultaneously not investing hastily in the next "Betamax" or completely reinventing the wheel. Instead of making "one big bet" or waiting for the "perfect" solution, insurers would be prudent to use an iterative, agile approach similar to that often used in software development. While this trial-and-error approach, with restarts and

requisite course corrections, may be uncomfortable or difficult for insurance professionals, it will speed time to market and ultimately deliver lower (not higher) development costs.

About Quincy Analytics

Quincy Analytics is a specialized consulting firm with deep expertise in the P&C, Life, and Disability insurance industries. We specialize in InsurTech as well as strategies for profitable growth in insurance including: net promoter analysis; core product and adjacency product line growth; profit pool opportunity assessment; organizational design and span-of-control optimization; strategic vendor management; and vendor complexity reduction. See more about us at **www.quincyanalytics.com**.

About the Author

Brian Kelley is the founder and Managing Director of Quincy Analytics. He began his career as a Bain & Company consultant and subsequently served as an executive with Liberty Mutual Insurance Group where he ran corporate strategy, integrated disability, and global e-commerce. He has consulted to numerous insurance carriers, insurance service providers, and private equity investors in insurance services and technology ventures.

Appendix and Reference

Select Biblio- and Videography

The internet is replete with articles, papers, opinions, explanations, and information (or *mis*-information) on blockchain. Rather than attempting to be exhaustive, below is a list of highly selective, cogent and relevant (to the insurance professional) additional readings (and short videos) on the topic. They are meant to be accessible to non-IT managers but do include enough substance on the blockchain technology and process to be informative/helpful. These do not represent the entirety of web and 3rd party research done for this paper; other relevant 3rd party work specifically used in this white paper are cited or noted in the document:

"The Blockchain Imperative: The Next Challenge for P&C Carriers": Cognizant, November 2016.

"Blockchain: A Potential Game-Changer for Life Insurance" : Cognizant, March 2017.

"Blockchain in Insurance: Risk Not, Reap Not": Cognizant, October 2017.

"Blockchain in insurance – opportunity or threat?": McKinsey, July 2016.

PwC (PricewaterhouseCoopers) has published a few, slightly more technical, but helpful pieces on two specific use cases in P&C insurance. They are:

"Blockchain: The $5 Billion Opportunity for Reinsurers": PwC, 2016.

"Chain Reaction: How Blockchain Technology Might Transform Wholesale Insurance": Long Finance - Z/Yen Group Limited (sponsored by PwC), July 2016.

For those who prefer a brief video introduction to blockchain in general, explore:

The Blockchain Explained - WIRED (2 minute video)

Blockchain, Explained - PCMagazine (YouTube Video - 5 minutes)

Glossary of Blockchain Terms
and Their Relevance for Insurance-Related Blockchain Applications
(as well as InsurTech terms often used in conjunction or confused with blockchain)

Below is a list of terms (jargon) the reader may encounter in reading or discussing blockchain applications in insurance. The challenge in using (and understanding) the technology "vernacular" is twofold:

- Some cryptocurrency-specific terms have crept into use for analogous activities in insurance applications of blockchain technology
- Some broader InsurTech applications and terms are often intermingled (or worse, share the same name albeit for a different reason) with blockchain when they may or may not have anything to with it at all

This glossary is not meant to be a technical one nor a comprehensive lexicon of all InsurTech terms. Rather, it aims to give a quick reference (a Rosetta Stone) to common blockchain terms for the insurance professional as well as clear up confusion or explain *blockchain* relevance of other InsurTech terms often used alongside or as part of blockchain discussions. Blockchain specific terms are in **bold, blue**.

Term	Acronym/ Initialism	In Plain English...
Artificial Intelligence	AI	AI uses computer coded logic (rules, procedures, protocols) to replace human effort (direct labor). While its impact in InsurTech (and the broader economy) is large it has noting *specific* to do with blockchain, although some AI initiatives in insurance may use blockchain technology.
Blockchain		A type of distributed digital ledger, secured by cryptography. Data in the chain is recorded sequentially and permanently (i.e. it is immutable) in 'blocks'. Each new block is linked to the immediately previous block with a cryptographic signature, forming a 'chain'. This tamper-proof self-validation of the data means transactions are processed and recorded without recourse to a 3rd party certification agent. The ledger is not hosted in one location or managed by a single owner, but is shared and accessed by anyone with the appropriate permissions.
Blocks		Transactions from the network fill blocks; the blocks are then sequentially linked in the chain. And, as the transactions are validated, they are compiled into the blockchain permanently. Blocks include a timestamp. They're built in such a way that they cannot be changed once recorded.
Cryptocurrency		A digital store of monetary value the primary use of which is for buying and selling goods, services, or property. Cryptocurrencies are cryptographically secured against counterfeit and often are not issued or controlled by any centralized authority. Cryptocurrencies can be referred to as tokens or coins. The original and well-known cryptocurrencies include Bitcoin, Ethereum, Ripple, Litecoin.

Glossary of Blockchain Terms (continued)

Term	Acronym/ Initialism	In Plain English...
Cryptography/ Encryption		Cryptography does not mean cryptic (mysterious, sketchy); rather it implies highly secured information using sophisticated mathematics, codes and ciphers. Used to verify (validate the transaction and identify the owner/initiator) and secure all blocks (transactions) in the chain.
Distributed Ledger Technology	DLT	Often used interchangeably with blockchain, the distributed ledger is central to and at the core of blockchain applications, but not the blockchain itself. Distributed ledgers are a type of database that are spread across multiple sites, countries or institutions. Records are stored one after the other in a continuous ledger (or chain).
Distributed Autonomous Organization	DAO	A decentralized organization where the method of governance is self regulating (autonomous), i.e., it's not controlled by some form of discussion, process, or committee (or government). The organization is run through rules encoded as computer programs called executable distributed code contracts (EDCCs or smart contracts).
Genesis block		The very first block in the blockchain.
Hash Rate		The number of hashes that can be performed by a miner in a given period of time (usually a second).
Hash/Hashing		The result of applying an algorithmic function to data in order to convert them into a random string of numbers and letters. This acts as a digital fingerprint of that data, allowing it to be locked in place within the allowing it to be locked in place within the blockchain. In cryptocurrency, "hashing" is the primary activity of "miners."
Immutability/ Immutable Storage		A fundamental advantage of blockchain technology. Each stored block is linked to its previous block in the chain with an encrypted digital fingerprint, making it almost impossible for hackers to subsequently change blocks. The validated, encrypted digital fingerprint also includes a date and time stamp. Any attempt to change data will be apparent, because the new digital fingerprint will not match the old one. This also provides full transparency on the history of transactions in the chain.

Glossary of Blockchain Terms (continued)

Term	Acronym/ Initialism	In Plain English...
Insurance on Demand	IoD	Applies to potential (or existing) insurance products that provide coverage whenever insured wants, wherever they want it (by the web, smartphone, tablet, smart-speaker (Alexa, Echo), etc.). While this has nothing specific to do with blockchain per se, the technology can be used in common microinsurance and P2P insurance applications.
Internet of Things	IoT	Use of sensors (RFID tags, microchips, other electronics) on physical items and environments to link information to the web/cloud. Can be used in insurance to assess (real time) underwriting characteristics (e.g. seatbelt use, vehicle speed, driving behavior, vehicle condition) or claims conditions. NOT a blockchain specific application; however, data acquired from IoT sensors can be included to enhance blockchain information and smart contracts.
Know-Your-Customer	KYC	KYC refers to blockchain applications that provide extensive identity veridiction - beyond traditional government ID checks and potentially involving additional 3rd parties such as credit agencies, social media profiles, etc. KYC is meant to reduce fraud; the CRM/customer experience improvements are a side benefit. In cryptocurrencies, it was instrumental in anti-money-laundering (AML) which plagued these applications early on.
Microinsurance		Historically applied to insurance for poor, under- or uninsured, remote risk pools with insufficient loss histories, loss frequencies or accessibility to allow for accurate or cost-effective underwriting; now applies to extremely niche (often miniscule individual) risks in the growing shared economy (who are often anything but poor, but often are unknowingly underinsured). Blockchain is NOT a prerequisite for meaningful aggregation (and data analysis) of these risks to identify and develop new products here, but it could facilitate doing so.
Miners/Mining		The process of trying to 'solve' the next block. Through mining, the users secure the network and verify computation and transactions. In cryptocurrency parlance, miners (sophisticated, costly, high powered, networked servers) are compensated (e.g. with Bitcoins) to validate transactions in the chain. In insurance, "mining" is often used analogously and interchangeably with block validation.
Node		A computer or server connected to the blockchain network. Any node that is active, possesses a copy of the blockchain providing "redundancy" of the chain. As a result, no single point of failure exists (see REDUNDANCY).
Oracles		NOT the technology company. In blockchain, oracles are bridges to information outside the chain - sometimes called real-world data. Oracles are particularly useful for smart contracts which may benefit from real-time data outside the chain. For example, imagine a cat insurance policy drawing live data from local weather towers, weather stations, and local radar for better underwriting or claims management.

Glossary of Blockchain Terms (continued)

Term	Acronym/ Initialism	In Plain English...
Oracles		NOT the technology company. In blockchain, oracles are bridges to information outside the chain - sometimes called real-world data. Oracles are particularly useful for smart contracts which may benefit from real-time data outside the chain. For example, imagine a cat insurance policy drawing live data from local weather towers, weather stations, and local radar for better underwriting or claims management.
Parametric Insurance		An insurance policy that does not indemnify the pure loss, but agrees to make a payment upon the occurrence of a triggering event, such as a natural disaster or other catastrophic event. While blockchain technology is NOT required for parametric insurance, it is often cited in blockchain literature and discussion, because the technology may be helpful in facilitating niche, low frequency, "microinsurance" classes of risk where insufficient loss history exists for traditional underwriting.
Peer to Peer	P2P	NOT to be confused with P2P insurance or insurance platforms in InsurTech such as Lemonade, Slice, Hippo, or Trov. While these applications may (or may in the future) utilize blockchain technology, the are not predicated on blockchain. Rather, in blockchain vernacular, P2P refers to the shared (distributed) data (ledger) used by each participant (peer) in the chain.
Proof of Work	PoW	This is the real value that "miners" (validators) do in the chain. By providing proof (via a highly encrypted signature) that a transaction is valid (i.e. meets the protocols/rules, is performed by a legitimate participant, and at a valid sequence (time stamp)), the PoW ensures consensus on the validity of the transaction and provenance of the chain. This is NOT trivial (i.e. check the box): it is performed by high-powered computers at great complexity and cost.
Redundancy		Since a blockchain in its simplest sense is a centralized database, some point to lack of redundancy (a backup) as a major obstacle or drawback. It is not. Given that the blockchain is live and a copy exists at any point in time that it is accessed (see NODE), redundancy is guaranteed.
Scalability		For a technology to succeed it must be scalable: that is, applicable widely enough to justify the cost of investment and to grow seamlessly as the need grows (in terms of market size, application to related uses, etc.). Given the niche applications of blockchain use cases in insurance thus far (e.g. crop insurance for poor farmers), the scalability to larger markets, lines of business, and integration with legacy technologies remains an issue.
Smart Contracts		Another key aspect of blockchain. Also known as a smart property, they are computer protocols that facilitate, verify, or enforce the negotiation or performance of a contract, or that make a contractual clause unnecessary. Smart contracts offer the opportunity to drastically reduce 3rd party (esp. legal) fees and improve efficiency and contractual term adherence.

Glossary of Blockchain Terms (continued)

Term	Acronym/ Initialism	In Plain English…
Telematics		NOT central to blockchain, although data gathered from telematics devices could be included in a blockchain application to facilitate implementation of user-based-insurance (See UBI). A telematics device – commonly known as a 'black box' – records driver information such as speed patterns, distance travelled, braking and cornering skill, etc., so the insurance provider can adjust premium accordingly, real-time.
Usage Based Insurance	UBI	Also known as Pay per Use/Pay per Mile insurance, this normally applies to auto insurance but could theoretically be applied to other lines (see MICROINSURANCE) where telematics (see TELEMATICS) monitoring devices can be employed. Blockchain is NOT a prerequisite, but the technology (utilizing telematics-collected data) could further the use and adoption of UBI products (e.g. SafeShare in the sharing economy).

EXAMPLES OF BLOCKCHAIN USE CASES		Portion of the Insurer Value Chain Affected						
Company or Collaboration	Description of Blockchain Application	New Market/ Product Development	Distribution (e.g. Agent/Broker)	Pricing/ Underwriting	Claims/Incident Management (FNOL)	Payment/Collections /Policy Administration	Reporting/Compliance /Regulatory	Reinsurance
AIG/IBM/Standard Chartered Bank PLC	Prototype smart contract insurance policy using blockchain to manage complex international coverage	●	●			●		
Allianz Global/EY/Citi/Ginetta	Captive management for large multinational commercial risks including blockchain payments		●		●	●		
Allianz Risk Transfer	Blockchain-based smart contract technology to facilitate and accelerate the contract management process of cat swaps and bonds. Done in conjunction with Nephila (an investment manager specializing in reinsurance and weather risk)			●		●		●
Bitcoin	Cryptocurrency/backbone/infrastructure					●		
Blem	Augmented existing XLRAS reinsurance administration system using blockchain technology for transaction timestamping and document retrieval to increase trust in reinsurance records							●
Blockverify	Blockchain-based anti-counterfeit solution (esp. products along the supply chain)			●	●			
Coinbase	Cryptocurrency/backbone/infrastructure					●		
Cryptid	Identity authentication on a distributed network (i.e. uses more than just traditional government issued IDs to verify identity - e.g. social media, private 3rd party agencies, etc.)			●	●			
Dynamis	P2P supplemental unemployment insurance using a blockchain protocol using the policy holders' social capital to (potentially) replace underwriters.	●	●	●				
Enigma (smart contracts)	Highly secure "smart contracts" are central to the blockchain and replace traditional contacts in the insurance transaction allowing credible transactions *without 3rd parties*		●	●	●	●	●	
Ereinsure.com	Limited use of blockchain service to augment its existing reinsurance platform							●
Ethereum	Cryptocurrency/backbone/infrastructure					●		
Everledger	Provides a digital ledger based on blockchain technology to track the provenance of high value items (esp. diamond). Assists in the underwriting of these risks and reducing fraud.			●	●			
InsurETH	UK only - flight cancellation and delay insurance offered in a P2P environment with contract resolved automatically on the Ethereum blockchain	●	●					
Rainvow	Based on the Ethereum platform, allows for insurance and payments based on weather affected events (P2P - limited application)	●	●	●		●		

EXAMPLES OF BLOCKCHAIN USE CASES (Continued)		Portion of the Insurer Value Chain Affected						
Company or Collaboration	Description of Blockchain Application	New Market/ Product Development	Distribution (e.g. Agent/Broker)	Pricing/ Underwriting	Claims/Incident Management (FNOL)	Payment/Collections /Policy Administration	Reporting/Compliance /Regulatory	Reinsurance
Ripple	Cryptocurrency/backbone/infrastructure					●		
RISKebiz	Utilizing blockchain technology, smart contracts, and real-time weather information to create a "blockchain-based risk pool for weather index insurance: aimed at providing low-cost crop insurance to small-scale farmers (limited opportunity)	●	●	●				
RSK (smart contracts)	Highly secure "smart contracts" are central to the blockchain and replace traditional contacts in the insurance transaction allowing credible transactions *without 3rd parties*		●	●	●	●	●	
SafeShare	Narrow "sharing economy" application in the UK only for office-space-sharing (Vrumi/UK) using blockchain to both validate and facilitate transactions and claims	●	●	●				
Shocard	Identity authentication on a distributed network (i.e. uses more than just traditional government issued IDs to verify identity - e.g. social media, private 3rd party agencies, etc.)			●	●			
SmartContract	Highly secure "smart contracts" are central to the blockchain and replace traditional contacts in the insurance transaction allowing credible transactions *without 3rd parties*		●	●	●	●	●	
Stratum/Lenderbot/ LemonWay/Deloitte	Insures short term (days/weeks) P2P lending transactions of high value electronics (e.g. cameras, smartphones, tablets) using the Bitcoin blockchain	●	●	●				
Tierion	Uses blockchain technology to verify data, files, and processes: audit trails; document timestamping; IoT data collection and provenance; regulatory compliance and transparency		●	●	●	●	●	

● While avid blockchain proponents may seem application across *ALL* value chain steps, meant to indicate meaningful, likely impact. Does not indicate order of magnitude: impact could be simply to improve efficiency; reduce costs; or eliminate cost and value chain step entirely.