

Blockchain: Emerging Use Cases for Insurance



Executive summary

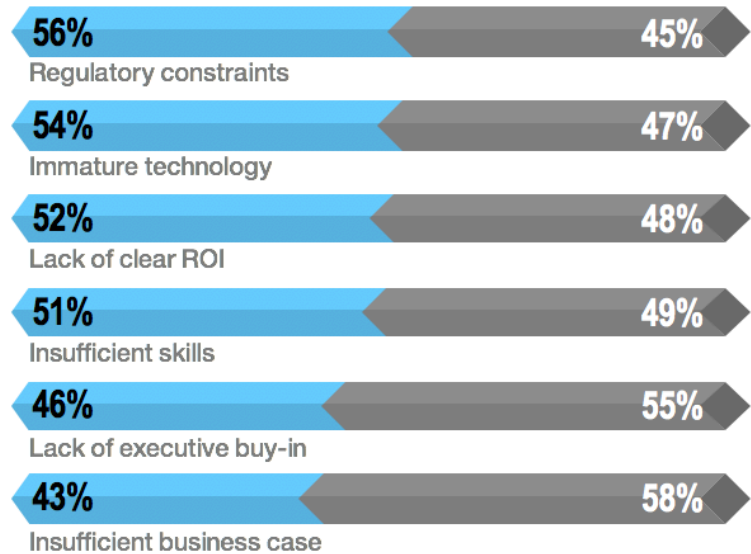
The insurance industry is looking at technology to enable new ways of working for the market. Blockchain is one such technology. Some of the First Mover Insurers (Trailblazers) are looking to blockchain to help drive their wider transformation agenda by focusing on new access to trusted information and new business models. These Trailblazers not only see the value in participating in the broader financial services blockchain ecosystem, but they also see blockchain as an opportunity to improve efficiency, lower the costs of transaction processing, enhance the customer experience, improve data quality, increase trust between parties and support auditability, among other benefits.

The emerging blockchain technology use cases for the insurance industry include Catastrophe Swap and bonds, P&C Claims settlement, Market Investments, financial audit and reporting, Index based live stock Insurance program, Flight Insurance, automating underwriting and claims settlement with the help of smart contracts, Internet of things (IOT), Parametric Insurance, High value assets Insurance, Reinsurance, and Medical claims processing.

The IBM Institute for Business Value with the support of the Economist Intelligence Unit surveyed 200 Financial Institutions in 16 countries on their experience and expectations with blockchains. The following is the summary of their findings on the Barriers to implementing Blockchain today:

Figure 1: Barriers to implementing blockchains today

Among top 3 barriers



The transformation of the Insurance industry is top-of-mind for everyone in the field and blockchain might be the hottest topic in the rapidly changing world of Fintech. But how can this technology really help Insurance firms? The following is our point of view (POV) to answering this question.

In our opinion this technology has the potential to “live-up to the hype” and reshape Insurance Industry, but requires careful collaboration with other emerging technologies, regulators, incumbents and additional stakeholders to be successful.

Blockchain Insurance Use cases

1. Catastrophe Swap and Catastrophe Bonds

Transactional processing and settlement between insurers and investors could be significantly accelerated and simplified by blockchain-based contracts.

Catastrophe or 'cat' swaps and bonds are financial instruments which transfer a specific set of risks, typically natural disaster risks such as hurricanes or typhoons, from an insurer to investors or other insurers utilizing triggers with defined parameters.

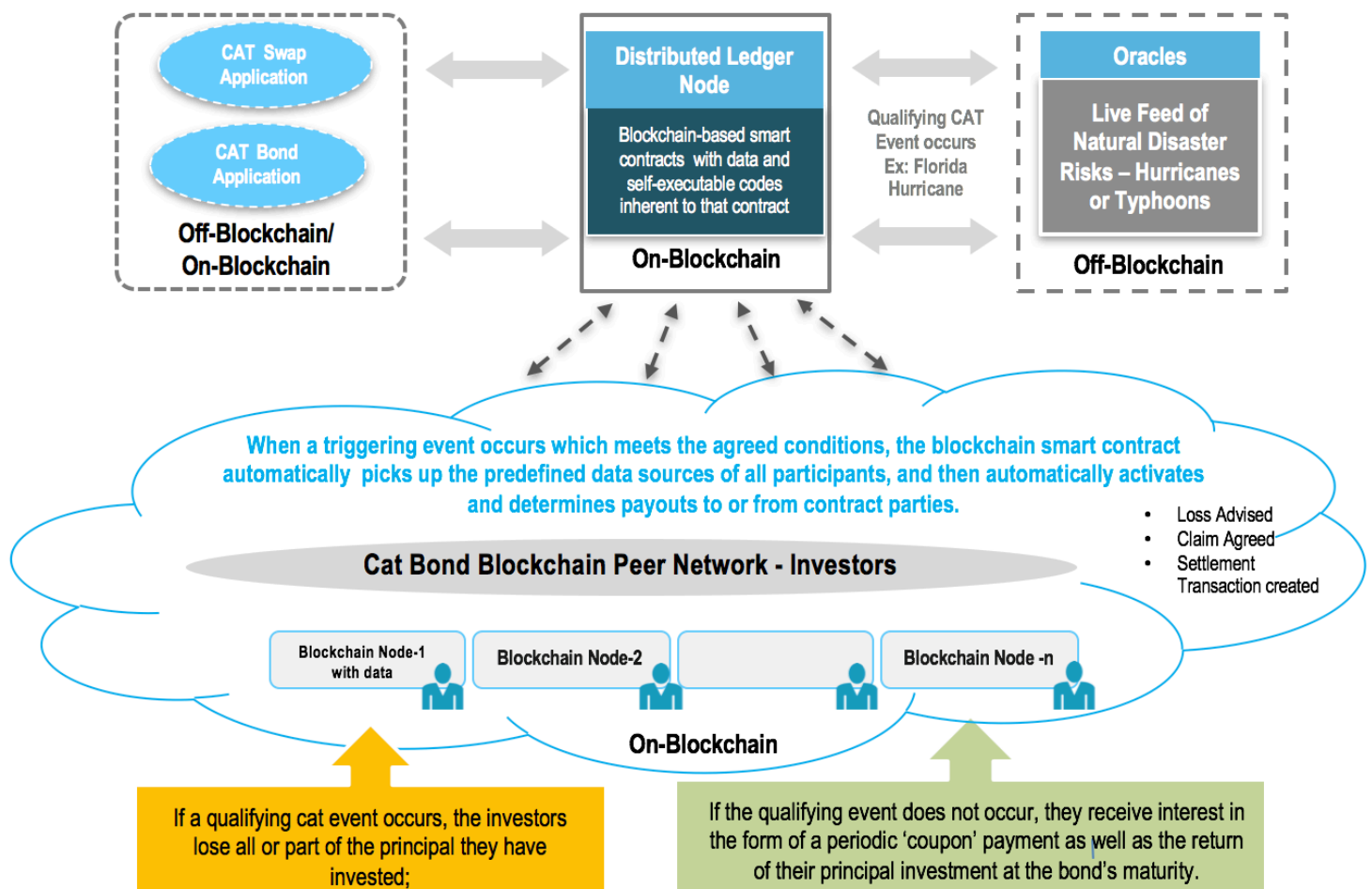
Cat Swaps

The insurer pays a third party to assume the financial

risk of a defined catastrophe event such as a Florida hurricane in exchange for a payment or series of payments. If the event occurs and meets the pre-defined trigger criteria, the third party is responsible for the pre-agreed financial risk.

Cat Bonds

Cat bonds follow a similar approach but with multiple parties assuming the catastrophe exposure through a securitized financial instrument in which the parties invest. If a qualifying cat event occurs, the investors lose all or part of the principal they have invested; if not, they receive interest in the form of a periodic 'coupon' payment as well as the return of their principal investment at the bond's maturity.



Smart contracts, combined with event triggers from off-chain oracles (trusted and secure sources of information) can be used to partially or fully automate operation of CAT Bonds

Blockchain-based smart contract technology has the potential to facilitate and accelerate the contract management process of such cat swaps and bonds. Each validated contract on the open shared infrastructure contains data and self-executable codes inherent to that contract. When a triggering event occurs which meets the agreed conditions, the blockchain smart contract picks up the predefined data sources of all participants, and then automatically activates and determines payouts to or from contract parties.

Blockchain technology would increase reliability, auditability and speed for both cat swaps and bonds as less manual processing, authentication and verification through intermediaries is required to confirm the legitimacy of payments/transactions to and from the investors

By replacing the human interventions which are currently embedded throughout the entire risk transfer process, frictional delays and the risks of human error are completely removed – with a radical effect on the speed and efficiency of the process and, in the case of bonds, on the tradability of such securities

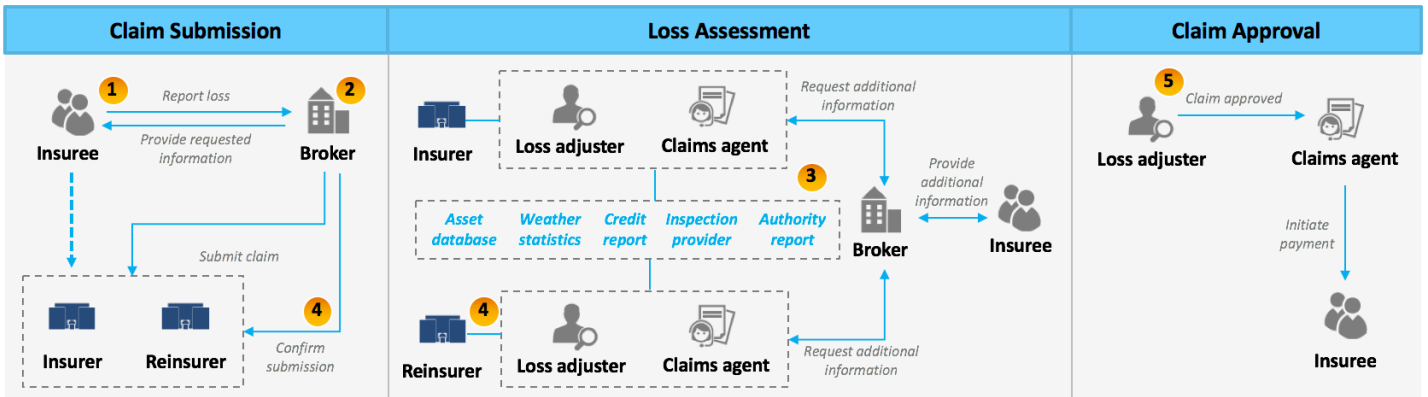
Blockchain, enables a single version of the truth (a ledger, copies of which are held by participants in a network) that has the potential to make multiple types of financial transactions more efficient and lower costs.

In the absence of Blockchain, core systems in Insurance companies use relational databases with unilateral consensus across different stake holders, and deploy reconciliation, settlement and audit services to build consensus across stakeholders. For example after a claim is reported the transactions are processed and entered into multiple databases in different ways (Ex: Underwriting, claims, accounting, reinsurance and investors data bases etc.) To make sure that there's only one version of the truth, all the stakeholders must reconcile all these versions constantly.

By recording transactions in a distributed ledger, Blockchain break down these large batch services by systemically incorporating them in a digital protocol based consensus that includes all counterparties and stakeholders of the transaction. Hence all stakeholders use that same piece of information, in the exact same way. So the inefficiencies involved in the relational databases, fragmented processing such as multiple reconciliations that creates operational risk and missed payments etc., disappear and provide a much more efficient and consistent view of single version of the truth to all the stake holders

2. P&C Claim Settlement

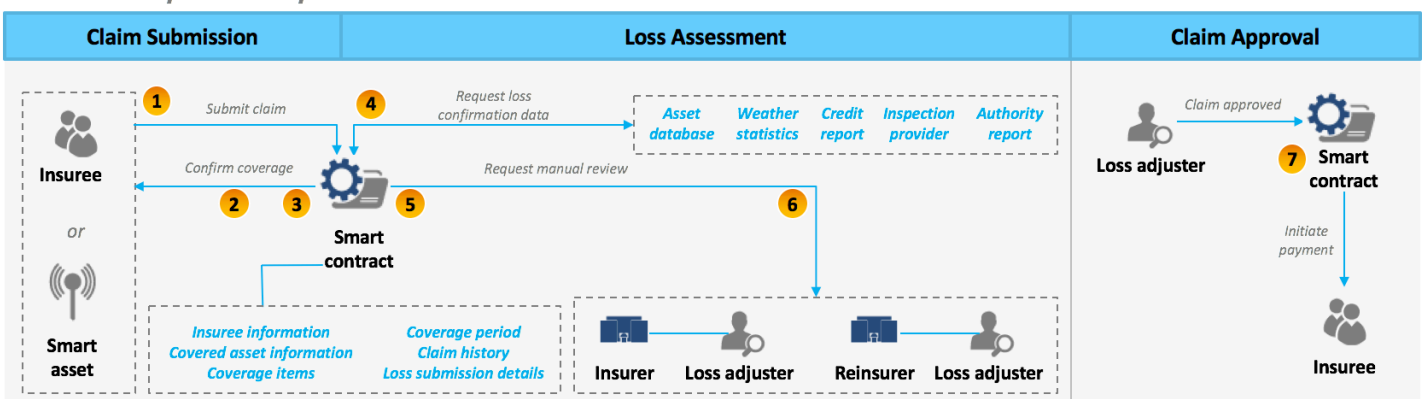
Current-state pain points



Current state pain points

- 1 Undesirable customer experience:** to initiate a claim, the insurer must complete a complex questionnaire and maintain physical receipts of the costs incurred by the loss
- 2 Costly intermediaries:** brokers act as intermediaries during processing, adding delays and costs to the submission
- 3 Fragmented data sources:** insurers must establish individual relationships with third-party data providers to get manual access to supporting asset, risk and loss data that may not be updated
- 4 Fraud prone:** the loss assessment is completed on a per-insurer and per-loss basis with no information sharing between insurers, increasing the potential for fraud and manual rework
- 5 Manual claim processing:** loss adjusters are required to review claims and to:
 - Ensure their completeness
 - Request additional information or use supporting data sources
 - Validate loss coverage
 - Identify the scope of the liability
 - Calculate the loss amount

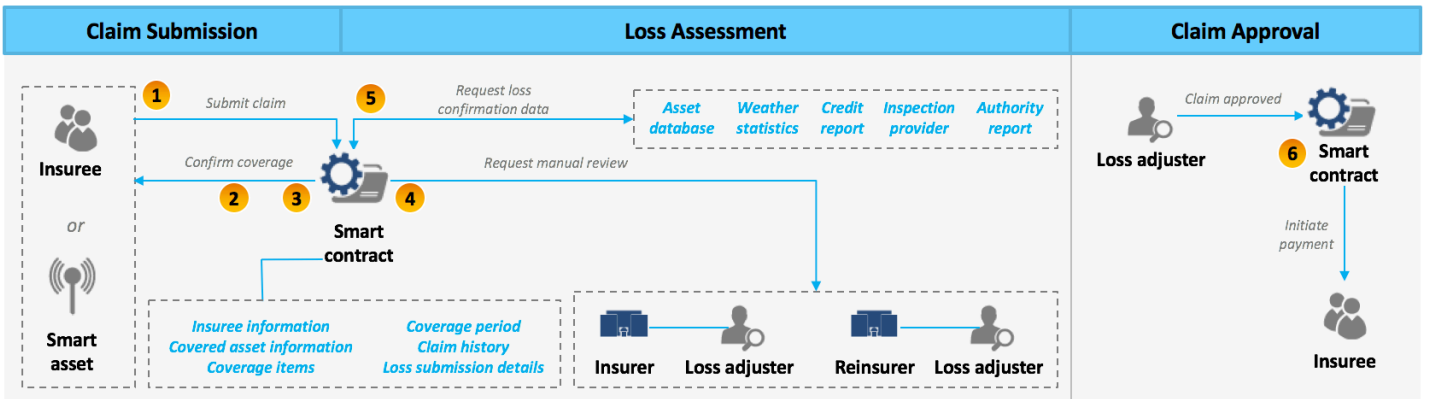
Future state process depiction



Future state process description

- 1** Loss information is submitted by the insurer or smart asset (via sensors or external data sources if the asset is technologically capable), triggering an automated claim application
- 2** For insurance policies issued via a smart contract, insurers receive feedback regarding initial coverage in real time
- 3** Claim due diligence is automated via codified business rules within the smart contract, using information submitted by the insurer
- 4** DLT automatically utilizes secondary data sources to assess the claim and calculate the loss amount
- 5** Depending on the insurance policy, a smart contract can automate the liability calculation for each carrier where a syndicate (or insurers or reinsurers) exists
- 6** In predetermined situations, the smart contract can trigger an additional assessment of the claim in order to reach a final decision/calculation
- 7** If the claim is approved, payment to the insurer is initiated via a smart contract







Future-state benefits







Future state benefits

- 1 Simplified and/or automated claim submission:** through a smart contract, the claim submission process will be simplified and/or fully automated (in cases of smart assets)
- 2 Enhanced customer experience:** through the streamlined transfer of loss information from insurer to insurer, DLT eliminates the need for brokers and reduces claim processing times
- 3 Automated claim processing:** business rules encoded in a smart contract eliminate the need for loss adjusters to review every claim (functionality will enable the loss adjuster to review the claim and provide a decision, in specific risk situations)
- 4 Reduction in fraudulent claims:** the insurer will seamlessly have access to historical claims and asset provenance, enabling better identification of suspicious behaviour
- 5 Integrated data sources:** DLT facilitates the integration of various data sources from trusted providers with minimal required manual review
- 6 Streamlined payment process:** in most cases, the smart contract will facilitate the payment automatically without effort from the back office

Critical Conditions

	 Building a comprehensive set of asset profiles and history	 Adopting standards for relevant claims data	 Providing a legal and regulatory framework
	 <p><i>Asset records must migrate to the DLT to allow smart contracts to consume reliable and updated asset information directly over the ledger in the case of a claim</i></p>	 <p><i>Insurers and regulators will play a key role in setting data standards and facilitating the adoption by external data providers to ensure the effective flow of information among the participants</i></p>	 <p><i>Regulators, insurers and other relevant stakeholders will have to establish a legal framework that regulates the validity of smart contracts as binding instruments for insurance policies</i></p>
Why?	If asset provenance and loss information are kept off the ledger among different players, smart contracts will lose their effectiveness to process claims automatically	If the data is not standardized, additional manual work will still be required, resulting in cost inefficiencies and jeopardizing gains	The absence of a legal precedent will expose the insurer and insuree to higher counterparty risk and disputes
Challenge	Engaging the market and enforcing a specific DLT as the dominant mechanism for asset registry may be challenging to implement and will require stakeholders diligence	Changing current company-specific processes and data sets to a shared standard will require extensive discussion and converging interests	Careful and close collaboration would be required since stakeholders will likely have competing interests and senses of urgency to establish a shared framework

Critical condition categories

-  Stakeholder alignment
-  Technology
-  Regulatory
-  Governance

Conclusion



Summary

- Claims automation: Claims processing can be automated using trusted third-party data sources and the codification of business rules in smart contracts on the ledger
- Reduced fraud: Transparent and immutable data on the ledger can also reduce fraudulent claims to a fraction of what they are today



Key takeaways

- Smart contracts will be key: Insurance policies can be managed using smart contracts on DLT, capturing coverage conditions, and syndicate insurance agreements or insurer - reinsurer agreements
- Loss adjustment expenses may become irrelevant: DLT utilization will fundamentally disrupt the cost and profitability ratios that are currently in use across the insurance industry



Outlook

- The application of DLT within insurance is currently in its infancy, with a number of incumbents and new entrants providing early proof of concept, focusing on:
 - Creation of immutable insurance claim records
 - Development of asset provenance to assist in risk profiling and claims processing
 - P2P insurance
- Opportunities exist for regulators/FIs to:
 - Monitor and assess new DLT-based products (e.g. P2P insurance)
 - Guide the industry towards a lower-cost model via the common and shared implementation of DLT



Unanswered questions

- Profitability: Will the automated processing of claims have adverse effects on loss ratios?
- Pricing: What impact will changes in loss ratios have on insurance premiums?

3. Market Investments

- Applying blockchain to market investments enables efficient transfer and administration of funds, financial collateral documentation such as letters of credit, investment and collateral instruments etc.,
- Matching of the transaction details of the buyer and seller, agreement of the price of the security, transfer of ownership and associated rights and obligations can be documented and executed upon.
- Trades can be settled and reports can be shared with all parties instantaneously auditability, conformance to rules and regulations and transparency is an added advantage
- Biggest associated benefit is reduction both in cost (through elimination of intermediaries) and time

4. Financial Audit and reporting

- The entire accounting system is built, such that forgery is impossible or at least very costly. To achieve this it relies on mutual control mechanisms, checks and balances. This inevitably affects every day's operations. Among other things there are systematic duplication of efforts, extensive documentations and periodical controls. Most of them are manual, labor intensive tasks and far from being automated. To date, that seemed to be the sacrifice of revealing the truth.
- Blockchain technology may represent the next step for accounting. Instead of keeping separate records based on transaction receipts, companies can write their transactions directly into a joint register, creating an interlocking system of enduring accounting records. Since all entries are distributed and cryptographically sealed, falsifying or destroying them to conceal activity is practically impossible
- Standardization would allow auditors to verify a large portion of the most important data behind the financial statements automatically. The cost and time necessary to conduct an audit would decline considerably. Auditors could spend freed up time on areas they can add more value, e.g. on very complex transactions or on internal control mechanisms.

5. Index based livestock Insurance Program

- Kenyan Livestock Insurance Program (KLIP), which has been test-piloted since autumn 2015, and which the government plans to roll out across Kenya's 14 counties.
- KLIP works as an index-based livestock insurance scheme, using the Normalized Difference Vegetation Index (NDVI), which measures plant "greenness" or photosynthetic activity. The NDVI is derived from satellite photos of land.
- The color of the ground is an indication of how dry the area is – yellow is very dry and green is not dry.
- Once a certain dryness threshold is reached, the farmers insured under the scheme automatically receive a lump sum payment which they can use to buy feed for their livestock. It is not to compensate for loss of livestock, but to protect the livestock from the effects of the drought in the first place.

6. Flight insurance policy

- It was observed that Passengers covered under Flight Insurance policies did not claim their travel insurance for delayed flights since filing a claim with all the information and evidences was cumbersome process for some customers.
- The smart contract solution automates claim pay out instantaneously to the affected passengers based on the flight data feeds. These smart contracts initiate payouts for insured flight tickets when cancellations or delays are reported from verified flight data sources (via so called "oracles" for making external sources usable for smart contracts in the blockchain).
- It cuts away the claim notification step by the insured and processes claim automatically by verifying facts from external parties resulting in closing the claims quicker, bringing down the cost of processing claim and achieving higher customer satisfaction.

7. Automate underwriting and claims handling

- P2P supplemental unemployment insurance and uses social network profile data for verification of the employers' status.
- In this case, the smart contracts are automating the underwriting of policies and claims handling – combined with approvals/verifications from other policyholders, who serve the role of evaluators

8. Internet of Things (IoT)

- Cars, electronic devices or home appliances can have their own insurance policies registered and administered by smart contracts in a blockchain network, automatically detecting damage first and then triggering the repair process, as well as claims and payments.
- The policyholder would have an account from which virtual currency payments are drawn on a continuous basis in proportion to the miles the policyholder has driven. Non-payment risk is virtually eliminated and to the extent that the policyholder's account is exhausted, the policy terminates – coverage simply exists up until the point of termination. The telematics system in each autonomous vehicle will record and relay the miles driven by the vehicle in real time and premium is calculated and paid automatically. Ultimately, motor risk would be priced more accurately.
- In usage based insurance, blockchain can be used for applications that register a policyholder's usage or health data, and let smart contracts calculate/update the tariffs..
- A smart contract for crop insurance combined with blockchain technology and crop sensors could support automatic settlement of claims for crop damage. In this scenario it is possible that receiving a settlement from the insurance company might be the first time a farmer would be aware that there had been crop damage

9. Parametric insurance

- Fully automated insurance products where an insurance contract is captured using smart contract language, and the underwriting and claims processes are event-driven using real world sensors and data.
- Smart contracts can automate certain aspects of insurance contracts, driven by cognitive services and trusted Internet of Things (IoT) data feeds
- Insurer issues policy that will pay based on actual risk event occurrences (parametric events) or to certain index thresholds (e.g. hurricanes, rainfall, temperature, amount of available feedstock vegetation).
- Claims payment is made to the insured based on the specific parameter being reached and the parameter's value is communicated from the agreed expert (aka "oracle")
- Details of claims payments automatically associated with the specific parameters triggering the payment for future refinement of contract, terms and conditions, and trigger parameters.

10. Insurance of high-value assets (Ex:Diamonds)

- Blockchain technologies can be used to catalog and verify the ownership of high-value assets, such as art, jewelry and other collectibles. This is already taking place as companies such as Everledger have emerged. Everledger supports diamond certification and related transaction histories through blockchain technology for insurance companies, owners, claimants and law enforcement.
- With this information, Everledger knows who owns which diamond and where it is at any given point in time. It has the capacity to trace the movement of diamonds on platforms such as eBay and Amazon as they are bought and sold and works together with insurers when diamonds are reported stolen, and alongside Interpol and Europol where diamonds are crossing borders and entering black markets.
- By tracking individual and cumulative values using events and smart contracts, better coverage and risk management processes can be recommended, improving value to the customer
- Faster cycle time and possibly no touch claims handling
- May reduce total claims cost due to enhanced information available to establish suitable replacement

11. Reinsurance

- Blockchain also has potential uses in reinsurance. Blockchain can be used to record details of claims so that insurers and reinsurers can accurately divide costs between them. In this case, since the blockchain provides an immutable record of claims, including time-stamping when those claims were made, this provides reinsurers with certainty that the information provided existed at that point in time

- A shared blockchain between insurers and reinsurers can provide a common view to contract details and associated financials, reducing disputes, easing re-insurance audits and smoothing cash flows. Smart contracts can automatically perform accounting adjustments as and when payments are exchanged.










12. Medical claims processing

- The claims process today has the potential for multiple calls, partial payments, disputed coverages, errors in billing, and crossed payment / billing cycles with delinquent bills sent through collection process
- By capturing and tracking changes to the claims file on a shared ledger, and using smart contracts to confirm the applicable terms and conditions at various processing steps in the claims processing chain, errors and re-work can be reduced and the accuracy and traceability of claims can be improved

Blockchain is more suited if the following conditions are fulfilled:

- Involves multiple parties
- Involves new intermediaries
- No need for a central trusted authority for executing various transactions
- Accurate record of the date and time of each transaction needs to be captured
- Retroactive manipulation of data is not encouraged
- Multiple uses of the same data is possible by different stake holders

IBM's experience in implementing Blockchain solutions

<p>FX Netting</p> 	<p>Settlements through digital currency</p> 	<p>Identity management</p> 
<p>Food Safety</p> 	<p>Trade Finance</p> 	<p>Channel Financing</p> 
<p>Low liquidity securities trading and settlement</p> 	<p>Reward points management</p> 	<p>Contract Management</p> 

How can IBM Help apply Blockchain

IBM is a founding member of Hyperledger, a Linux Foundation Project and has been a leading voice in developing collaborative open standards for distributed ledgers and smart contracts. Here is an overview of The Linux Foundation, Hyper Ledger and its respective sub-projects:

The Linux Foundation®

The Linux Foundation is the organization of choice for the world's top developers and companies to build ecosystems that accelerate open technology development and commercial adoption. Together with the global technology community, The Linux Foundation is solving the world's hardest problems through open source and creating the largest shared technology investment in history. Founded in 2000, The Linux Foundation today provides tools, training and events to scale any open source project, which together deliver an economic impact not achievable by any one company.

Hyperledger

Hyperledger is an open source collaborative effort created to advance cross-industry blockchain technologies. It is a global collaboration including leaders in finance, banking, Internet of Things, supply chains, manufacturing and Technology. The Linux Foundation hosts Hyperledger under the foundation.

IBM Hyper ledger Frameworks

Hyperledger Iroha

Hyperledger Iroha is a blockchain framework and one of the Hyperledger projects hosted by The Linux Foundation. Hyperledger Iroha is designed to be simple and easy to incorporate into infrastructural projects requires distributed ledger technology. Hyperledger Iroha features a simple construction, modern, domain-driven C++ design, emphasis on mobile application development and a new, chain-based Byzantine fault tolerant consensus algorithm, called Sumeragi. Hyperledger Iroha was initially contributed by Makoto Takemiya (Soramitsu), Toshiya Cho (Hitachi), Takahiro Inaba (NTT Data) and Mark Smargon (Colu).

Hyperledger Sawtooth

Hyperledger Sawtooth is a blockchain framework and one of the Hyperledger projects hosted by The Linux Foundation. With potential in many fields, from IoT to financials, Hyperledger Sawtooth has an architecture that recognizes the diversity of requirements across the spectrum with support for both permissioned and permissionless deployments. It includes a novel consensus algorithm, Proof of Elapsed Time (PoET), which targets large distributed validator populations with minimal resource consumption. Designed for versatility and scalability, Hyperledger Sawtooth was initially contributed by Intel.

Hyperledger Fabric

Hyperledger Fabric is a blockchain framework implementation and one of the Hyperledger projects hosted by The Linux Foundation. Intended as a foundation for developing applications or solutions with a modular architecture, Hyperledger Fabric allows components, such as consensus and membership services, to be plug-and-play. Hyperledger Fabric leverages container technology to host smart contracts called "chaincode" that comprise the application logic of the system. Hyperledger Fabric was initially contributed by Tamas Blummer (DAH) and Christopher Ferris (IBM), as a result of the first hackathon.

IBM Hyper Ledger Modules

Hyperledger Blockchain Explorer

Hyperledger Blockchain Explorer is a blockchain module and one of the Hyperledger projects hosted by The Linux Foundation. Designed to create a user-friendly Web application, Hyperledger Blockchain Explorer can view, invoke, deploy or query blocks, transactions and associated data, network information (name, status, list of nodes), chain codes and transaction families, as well as any other relevant information stored in the ledger. Hyperledger Blockchain Explorer was initially contributed by Christopher Ferris (IBM), Dan Middleton (Intel) and Pardha Vishnumolakala (DTCC).

Hyperledger Cello

Hyperledger Cello is a blockchain module toolkit and one of the Hyperledger projects hosted by The Linux Foundation. Hyperledger Cello aims to bring the on-demand “as-a-service” deployment model to the blockchain ecosystem to reduce the effort required for creating, managing and terminating blockchains. It provides a multi-tenant chain service efficiently and automatically on top of various infrastructures, e.g., baremetal, virtual machine, and more container platforms. Hyperledger Cello was initially contributed by Baohua Yang and Haitao Yue (IBM), with sponsors from Soramitsu, Huawei and Intel.

For More Information

More information on IBM's commitment to Blockchain can be found at www.ibm.com/blockchain.

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Shyam Kumar Yerramsetti is working as Senior Managing Consultant in IBM's Insurance COC(Center Of Competency). Mr. Shyam is recognized as one of the thought leaders within IBM on how to deliver leading edge solutions that combine Cloud, Big Data, Analytics, Mobility, Telematics and IBM Watson cognitive computing technologies. He specializes in helping Insurance companies to fundamentally transform the customer experience, customer insight and customer engagement by leveraging advanced research capabilities from

IBM research. Mr. Shyam has over 10 years' experience within the insurance industry (Commercial Property & Casualty, Healthcare, and Personal Lines) and another 15 years of consulting experience in world's leading IT companies. He has co-authored industry white papers, and worked as SME in major transformation projects for the world's largest insurance companies. In addition to masters in Engineering, Shyam is a qualified CPCU and FLMI. Shyam can be reached at shyam.kumar@in.ibm.com.

Sources

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