



**London Market Target Operating Model
Blockchain / Distributed Ledger Technology**

DISCUSSION PAPER

“Blockchain ? So what ?”

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1 Executive Summary

The London Market Target Operating Model (LM TOM) Innovation workstreamⁱ has run two blockchain Proof of Concepts (PoC's). The objectives being to better inform ourselves about how the technology works, identify potential applications in the market (specifically as part of LM TOM) and to determine if the technologies provide a compelling argument to change the strategy/architecture laid down in the LM TOM Blueprintⁱⁱ.

In November 2016 an Interim Report was published which described the investigation of blockchain / Distributed Ledger Technology (DLT) and reported on the first of the PoC's. A separate report has been commissioned into the potential of Smart Contracts in the London Wholesale Insurance Market. This is a particular capability associated with blockchain platforms that was not included as part of the PoC's.

The two PoC's we conducted answered the "So what?" question by demonstrating:

- An opportunity to radically rationalize and reshape inefficient processes by removing the need for data to be updated or reconciled independently by each party at each stage of the process. This could significantly transform the operational expense base of the market where significant effort is currently expended on this activity
- The technology supports the diversity of business models and interactions in operation today and envisaged in the future, and it can support both peer to peer and centralized interactions
- Reconciliation costs can be significantly reduced with blockchain by removing the need for organizations to update their own copy of shared data – the system ensures all participants have a synchronized, consistent, copy. This also avoids the "which version are you referring to?" as everyone is accessing a consistent version
- Whilst many of the features such as secure, resilient, unalterable evidence are available through traditional technologies, blockchain is unique in providing them "out of the box"
- There is no single point of failure – if a node fails then other participants are able to continue accessing their data
- The PoC's have proved that a blockchain approach can be used as an alternative method to traditional relational database applications

The summary therefore is that blockchain/distributed ledger-based solutions provide the opportunity to significantly improve processes that involve multi-party activity. There are opportunities across the entire value chain to improve how we process and manage premiums, claims, risk placement and potentially provide "services" such as document management, reference data and Identity Management.

2 Purpose of Document

Early in 2016 the London Market Target Operating Model (LM TOM) programme initiated a series of innovation activities to explore the use of Blockchain / Distributed Ledger Technology (DLT) in the London Market. In November we issued an interim report based on initial findings. This latest document summarises the final conclusions and provides recommendations for next steps. It is intended to stimulate discussion and debate!

3 Intended Audience

- TOM Working Group
- TOM Programme
- London Market Professionals
- Technology Providers

4 Background

A high level, basic, review of the subscription insurance value chain (from quote through to accounting & settlement, with placement, premiums, claims, coverholders, etc. all considered) was undertaken. In parallel a capability scan of vendors was undertaken and a short list of prospective use cases and parties to work with developed.

The initial PoC, based around the Claims Bordereau submission process, was run with market practitioners and developed by PwC. This was used to validate that a blockchain-based solution could be adopted instead of a traditional relational database based system. The second PoC, based around the Delegated Authority Coverholder Application KYC process, was run with market practitioners and developed by Tradle.

Both PoC's were business focused and intended to prove that processes could be replicated and could offer additional benefits beyond traditional technologies. They achieved their intended goals, however Non-Functional capabilities, such as security, performance, interoperability and scalability were not in scope and would need to be assessed before proceeding with any initiative to a pilot phase.

5 What is Blockchain/Distributed Ledger Technology ?

When Businesses undertake financial transaction, they maintain details of what they've paid, received, who from/to, etc. These are called ledgers. A Mutual Distributed Ledger (or simply a Distributed Ledger) is when all participants have an identical, synchronised, copy of the ledger which includes all transactions and has cryptographic security applied so that each party can only see its own transactions. The term Blockchain is used to describe how data is stored – effectively as blocks of cryptographically secured data that reference each other such that data can only be appended and not edited. A simple definition is that it is:

A write-only, distributed database that is cryptographically secured and timestamped such that it provides complete auditability of all transactions that it holds.

6 Use Cases & technologies explored

6.1 Use Case 1 – Claims (Bordereau) submission

For this PoC, a basic (web-form based) application was developed to allow users to interact with the system. Smart Contracts were used for the program layer to provide basic functionality (but not to test Smart Contracts per se). Eris was selected by the PwC Blockchain team as being an appropriate protocol which provided the consensus (using Tendermint) and transaction layers. Additional documents (e.g. pdf's) were stored using IPFS (Interplanetary File System) and referenced from the blockchain.

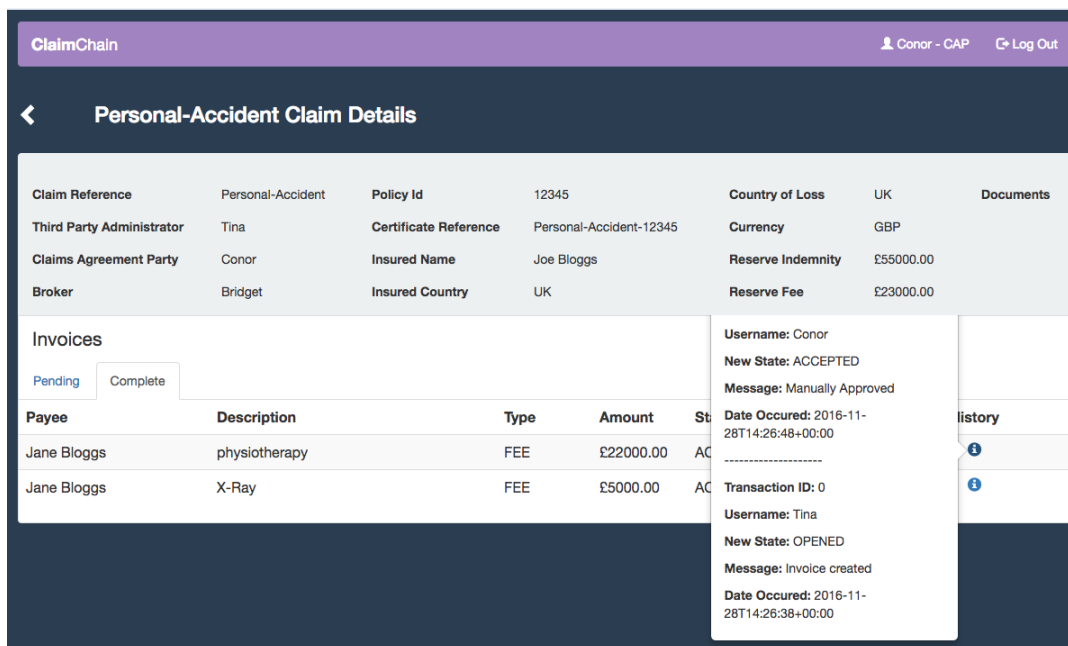


Fig 1 – Claims (bordereau) submission PoC - Claims Detail screenshot

The current process is fairly linear in nature, with the TPA submitting a Claims Bordereau file to the Broker who reviews and approves and/or rejects the file in its entirety. On approval the files is passed to the CAP who then agrees or rejects the file and if approved manages the payment process.

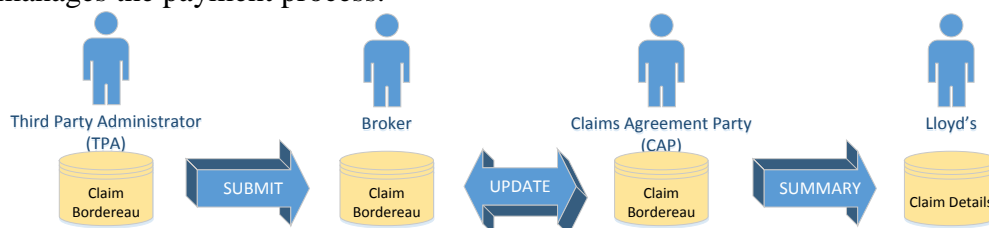


Fig 2 – As-Is Claims bordereau process (simplified)

Using the technologies described above PwC were able to remodel the process and data flow so that all authorised parties were able to view data and status at the same time. This included changes to the data and status made.

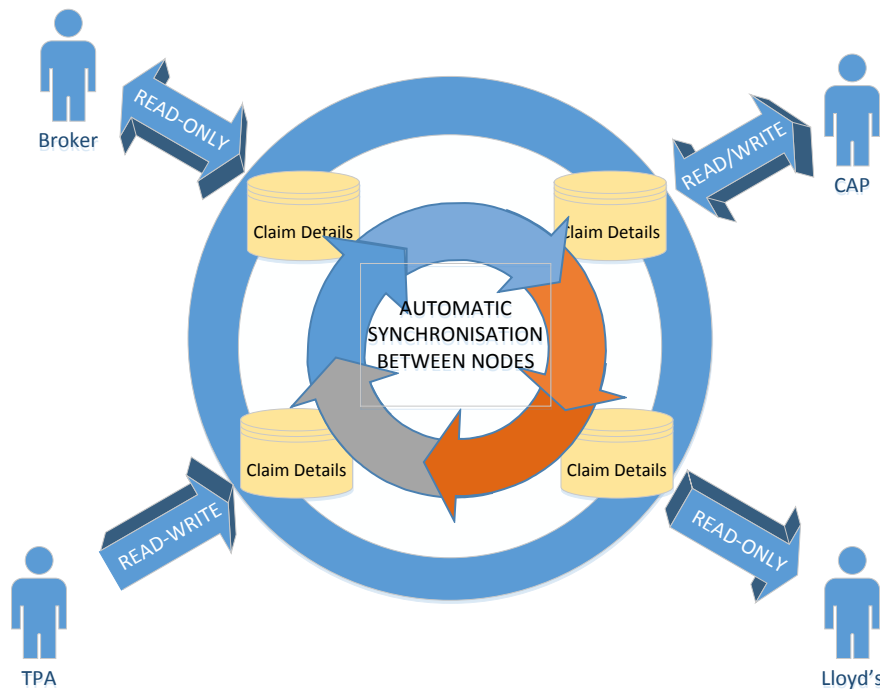


Fig 3 – Conceptual future Claims bordereau process

Crucially this means that records can be added, reviewed and accepted or rejected by relevant parties and without requiring the entire file to be updated. This should reduce rework across the value chain and speed claims agreement and settlement.

6.2 Use Case 2 – DA KYC Coverholder Application

For the second PoC, web-form based versions of the application were used as well as iOS and Android installed Apps. To explore an alternative to a standard web-form, the application layer used a “chatbox style” for interaction between participants. A different document storage/security model was used in the second PoC whereby additional documents (e.g. pdf’s and photos) were stored on the local devices of those participants authorised to have access to them. This allowed a different security model to be considered. For maintaining a transaction ledger, whilst the first PoC used Eris, this PoC used the Bitcoin blockchain.

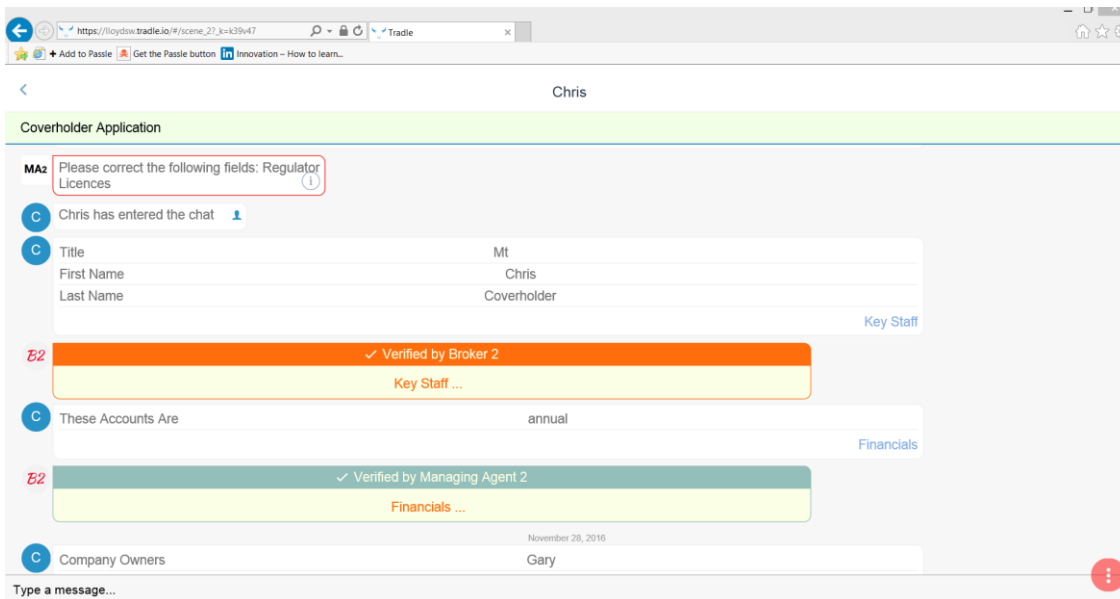


Fig 4 – Coverholder Application PoC screenshot

The existing linear Lloyd’s Coverholder Application process was examined - whereby an applicant creates a set of documents which are submitted to the sponsoring Lloyd’s broker for entry in Atlas, the Lloyd’s Coverholder Management system. The sponsoring broker may then request changes/additional information from the applicant before passing the details to the Managing Agent (M.A.). The M.A. may then query/request updates/changes, via the Broker who then follows up with the applicant. Once all parties are satisfied the application is submitted to Lloyds who also consider the application and may request further information before approving or rejecting the application.

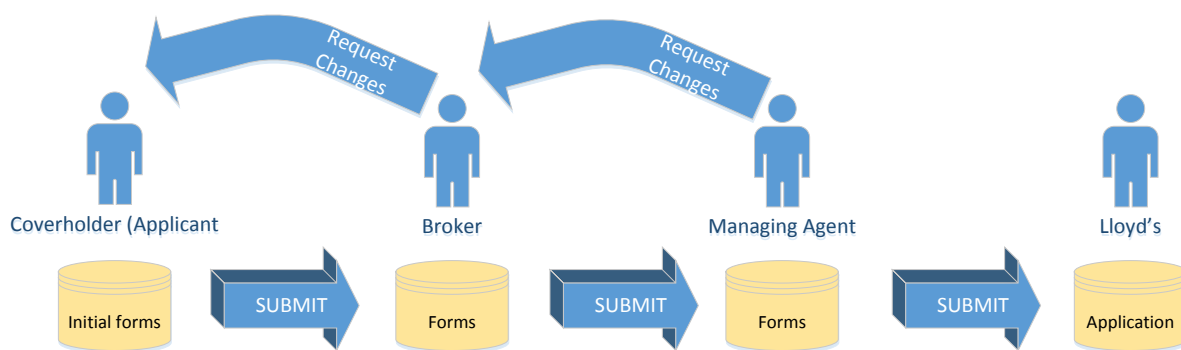


Fig 5 – Coverholder Application process (simplified)

Using the blockchain-based approach, we were able to create a process whereby a Coverholder could begin an application (via a web browser, Android or iOS device). The documentation could be reviewed/queried by the Broker while it was being assembled by the Coverholder applicant. Throughout the process all documentation was kept in-synch and a copy of the dialogue was retained. When the application document set was at a suitable level of completion it could then be shared with a nominated Managing Agent. The

M.A. was able to review the forms and generate queries/requests for updates directly with the applicant. The Coverholder was able to elect to share selected documents with other M.A.'s (e.g. a professional indemnity certificate relevant to two separate cover applications to two separate M.A.'s) In this case the documentation was distributed to each party and the dialogue retained.

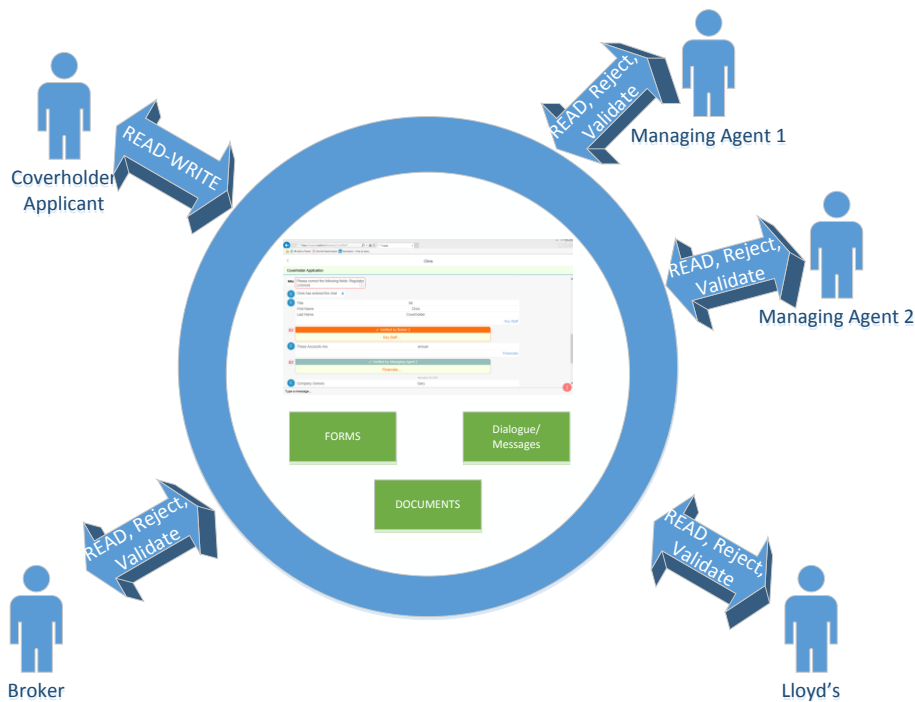


Fig 6 – Conceptual future Coverholder Application process

6.3 Use Case Comparison

Element	Use Case 1	Use Case 2
Process Use Case	Claims (Bordereau) processing	Lloyd's Delegated Authority Coverholder Application
Technology Partner	PwC	Tradle
Application Layer	Web Form	Web Form iOS App Android App
Contract Management/Program Layer	Bespoke development	Bespoke development
Consensus/Security	Tendermind	Bitcoin
Data/Transaction	Eris (Monax)	Bitcoin
Documents / other data	IPFS	??
Implementation	Private	Public (permissioned)



Multi-party sharing?	YES	YES
Ability to cope with node failures?	YES	YES

Although we used the claims bordereau and DA KYC processes, the PoC's were actually intended to explore the wider themes of document management & sharing and workflow in a resilient, secure, environment.

In summary the PoC's allowed us to evaluate moving from linear processes, with everybody maintain copies of their own data and documentation, to a distributed/synchronized model which mean that there was a reduced need for reconciliation, checking which versions of documents were being used, etc.

7 Conclusions

At the beginning of our research a number of prospective targets were identified as having potential to be disrupted by blockchain. Originally a list of over 80 candidate use case process were identified and a couple selected to run PoC's. By running two PoC's, with two vendors and exploring several technology options we have been able to conclude that the PoC's can be used as a proxy for the potential impact on other processes and weren't reflective of a single technology or vendor capability.

The way in which a blockchain-based solution can be adopted in an insurance context includes:

(1) For a Market

- As a ledger of (financial) transactions – helping to digitize processes and providing efficiency gains through a significant reduction in reconciliation
- To provide a secure document management repository which supports the negotiation/risk placement process by providing change management to ensure that all participants are referencing the correct version of documents
- As a reference source of Identity
- As a referenceable timestamping service (transaction proofs)
- As a secure document repository (not necessarily putting the documents themselves on a blockchain but instead putting cryptographic seals or hashes on the blockchain)
- To provide Reference Data Management

(2) To support non-core functions

- Know Your Customer (KYC) processes
- Anti-Money Laundering compliance
- Regulation and Sanctions compliance

(3) As a product

- Through the execution of Smart Contract to automate processes (e.g. improve claims handling through automation (considered in separately commissioned report)
- To support parametric products – e.g. Natural Catastrophe bonds ⁱⁱⁱand Insurance Linked Securities (ILS)

(4) Integration with other emerging technologies

- Internet of Things – the ability to use tracking devices to capture data on an object's position at a point in time (whether the object is a ship, a container or even an individual item in a container) is being explored by a number of companies to improve supply-chain management. Recording the data on a blockchain means that the provenance of the goods can be recorded and the entire history can be retained.

This provides an opportunity for insurers to build new products that can utilise this additional information by linking it with other data sources. One example is to link marine container tracking (which allows much more granular exposure management) with weather reporting systems^{iv}.

- Machine Learning/Deep Learning/Artificial Intelligence – Using blockchain as the ultimate repository of immutable data linked with the power of AI will allow new patterns and datasets to be identified and exploited for pricing^v

(5) Developing alternative Financial Instruments

- Micro-insurance (i.e. small time-bound period of cover)^{vi}
- Micro-policies could become tradeable commodities with a blockchain-based marketplace allowing units to be bought & sold^{vii}
- Binary bet/event protection – new class of financial instrument providing alternate risk transfer mechanism^{viii}
- With closer monitoring of consignments through IoT and recording on blockchain, Trade Finance^{ix} (and so Trade Finance Insurance) could become much more granular and provide more niche opportunities for new insurance products or alternatives

As the remit of LM TOM is around Operational process improvement any recommendations are limited to (1) and (2) above.

8 Recommendations

- The LM TOM Programme should ensure that blockchain-based solutions are considered as part of any future work. The LM TOM Blueprint identified a number of prospective targets and our findings as part of the PoC's have confirmed that the technology is indeed a viable option. The programme should regularly review the Blueprint to explore further opportunities to innovate with new technology
- For components of LM TOM which are being delivered as a service or for which a platform or application will go through a traditional supplier/RFI/RFP type approach then we should encourage submissions to consider how blockchain / distributed ledger could help to make their proposition more adaptable to technology innovation. NB: This is not suggesting that the technology should be mandated rather that vendors should be encouraged to be innovative in their thinking about how they could exploit new technologies.
- Having explored the technology through PoC's we should now consider selecting a Use Case and moving to a Pilot implementation. A Proof of Concept should be considered as a learning exercise and as an opportunity to explore concepts. A pilot, in comparison, is a development of a capability with the expectation that it will be deployed and extended. This requires a different approach as it means elements such as interoperability, security, performance and scalability are essential to be

designed in to the solution. For the London Market it also requires somewhat greater rigor around requirements, design, development, user testing, acceptance testing and market acceptance testing. A number of prospective candidates for PoC's and Pilots are proposed below.

8.1 Low Risk – Pilot options

These are a number of activities across the market which are back-office facing, i.e. do not directly impact the Premium/Claims/Risk process flows, for example:

- KYC checking (e.g. Coverholder approval, supplier onboarding, employee onboarding)
- AML/Sanctions/Due Diligence checking
- Provision of value-add services that don't currently exist – e.g. creation of document timestamping/hashing

8.2 Medium Risk – PoC or Pilot options

Would require some interfacing and could exist core business processes:

- Identity Management/Service
- Reference Data Management
- Claims Handling

8.3 High Risk / High Impact – Warrant further consideration

These are all capabilities that are either front-office or are critical components to the value chain. They should however still be considered as prospective candidates to adopt blockchain capabilities:

- Risk Negotiation and Placement
- As an alternative secure document repository – e.g. An Insurers Market Repository including retaining documentation on premiums, claims and MRC & MRCE
- Bureau processing / Accounting & Settlement

9 Appendix

9.1 Glossary of Terms

TERM	Category	Description
AML	General	Anti-Money Laundering
B3I	General	Blockchain Insurance Industry Initiative (consortia formed in 2016)
CAP	London Market	Claims Agreement Party
CORDA	Technical	Interoperable framework developed by R3CEV (q.v.)
DA	London Market	Delegated Authority (Coverholder)
DLT	Technical	Distributed Ledger Technology
ECF	London Market	Electronic Claims File
FCA	Regulator	Financial Conduct Agency – UK Regulator
IPFS	Technical	Inter-Planetary File System
KYC	General	Know Your Customer
LM TOM	London Market	London Market Target Operating Model – a multi-year programme to modernize the Specialist Lines insurance market in London
LMIX	London Market	London Market Innovation Exchange
MA	London Market	Managing Agent
MRC	Market Reform Contract	Standard format insurance contract
MRCE	Market Reform Contract Endorsement	Standard format insurance contract amendment
PoC	General	Proof of Concept – a time-boxed piece of research/development to explore a concept or idea
TOM	London Market	Target Operating Model – known as LM TOM (qv)
TPA	London Market	Third Party Administrator

9.2 Document Control

Date	Version	Status	Author	Comments
11/01/17	1.0	Final	Gary Nuttall	Base version

9.3 References

ⁱ London Market Target Operating Model – Innovation (LM TOM, accessed 19 Oct 2016):

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ⁱⁱ LM TOM Blueprint (LM TOM, accessed 19 Oct 2016): <http://isupporttom.london/blueprint/>

ⁱⁱⁱ Allianz bets on blockchain for catastrophe bond trading (Reuters, 14 Jun 2016):

<http://uk.reuters.com/article/allianz-blockchain-idUKL8N1961VY>

^{iv} IBM Watson IoT and its integration with Blockchain (Tractica, 01 Aug 2016):

<https://www.tractica.com/automation-robotics/ibm-watson-iot-and-its-integration-with-blockchain/>

^v Innovation in insurance: how technology is changing the industry (Institute of International Finance Sept 2016): <https://www.iif.com/publication/research-note/innovation-insurance-how-technology-changing-industry>

^{vi} Stratumn and Deloitte unveil blockchain-based micro-insurance PoC (Finextra, 15 Dec 2016):

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^{vii} Building a Risk Market for the Digital Age (RiskBazaar, 17 Aug 2015): <https://riskbazaar.org/#/whitepaper>

^{viii} Dynamis – If Insurance, Then Blockchain (Digital Insurance News, 04 Mar 2016): <http://www.the-digital-insurer.com/blog/insurtech-dynamis-if-insurance-then-blockchain/>

^{ix} Blockchain Trade Finance (Capco, 2016):

http://www.capco.com/uploads/articlefiles/747/file_0_1473923235.pdf