

**Better-working  
insurance: moving  
blockchain from  
concept to reality**

# Imagine a different kind of insurance industry,

one where all parties in the insurance value chain have the same risk data at the same time. The data is linked automatically to digital contracts which can trigger automated processes. Everyone trusts the accuracy of the data and can share it easily. World-class encryption provides the necessary security, and there's a clear, immutable audit trail to underpin end-to-end underwriting and claims governance.

In such a world, there would be a platform to enable more collaboration and greater transparency. With many activities automated and some eliminated entirely, administrative costs would fall. All players in the value chain could focus on higher-value activities and delivering better client service. Insurers could better allocate their costs to reinvest in underwriting new product lines. They would also benefit from greater visibility on the deployment of capital. The industry would become more efficient. Innovation and profitable growth could flourish, despite difficult commercial circumstances.

EY and Guardtime believe such a world is very much in reach, thanks to the maturation of blockchain and distributed ledger technology. Based on our shared vision and the support of other key collaborators, we led a 20-week proof-of-concept project to demonstrate how a blockchain-enabled platform could deliver major gains in transparency, efficiency and auditability in the insurance value chain. We investigated which elements of the existing insurance business model could be changed to become more sustainable.

Our initial effort focused on marine insurance – a complex, global ecosystem that is ready for transformation – but the platform we are developing is clearly relevant to other insurance markets. The prototype provided critical insights about the upside of data sharing and the need for industry collaboration, but also raised important business and technical questions. As you will see on the following pages, we are actively seeking answers as we create an enterprise-scale, blockchain-enabled platform to integrate and secure the entire stream of disparate data sources involved in insuring shipments around the world.

An important step in the move from concept to reality, the emergence of this blockchain platform clearly demonstrates why it is an exciting time for the insurance industry.

**Shaun Crawford,**  
EY Global Insurance Leader

**Mike Gault**  
CEO, Guardtime

# Blockchain: from potential benefits to actual value

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At EY and Guardtime, we believe that blockchain and distributed ledger technologies – when combined with other disruptive technologies – have the potential to transform the industry,<sup>1</sup> and we have defined the kind of architecture an insurance blockchain service would need.<sup>2</sup> Following a 20-week proof-of-concept project, which proved these potential benefits can be achieved in the real world, we are building a working blockchain platform that connects every major stakeholder in the insurance value chain.

Initially, the platform is focused on marine insurance. Because marine insurance is a complex international ecosystem, with multiple parties, multiple jurisdictions, high transaction volumes and significant levels of reconciliation, it is well-suited to a blockchain-enabled solution. Moving forward, the platform can support other insurance markets.

Our collaborators include Maersk, the world's largest shipping company; Willis Towers Watson, the leading multinational broker; two major independent specialist insurers, XL Catlin and MS Amlin; and Guardtime, the world's largest blockchain company by revenue, headcount and actual customer deployments. Microsoft, which has a proven global blockchain architecture and trust model, is working with us to make the platform available on Azure, its cloud platform. ACORD, the international insurance industry data standards body, continues to help us think through how we contribute to international standards for wider adoption.

We engaged directly with a multinational shipping company to understand its challenges and pain points and then designed ways to address them at every point across the value chain. Further, we worked with an insurer to identify opportunities to re-engineer processes in line with customer expectations. This business-led approach focused on how a technology (blockchain) could solve specific commercial problems, rather than finding problems that a technology might address.

## We are building our platform in association with:

- ▶ **Maersk**  
The world's largest shipping company
- ▶ **ACORD**  
A global, nonprofit association working to improve data quality and information exchange for the insurance industry
- ▶ **Microsoft**  
Provides the proven Azure global cloud platform and enterprise services including Azure App Services, API Management, Azure Active Directory and Data Factory
- ▶ **MS Amlin**  
A leading specialty insurer operating in 25 locations across the globe
- ▶ **Willis Towers Watson**  
A global advisory, broking and solutions company with more than 40,000 employees
- ▶ **XL Catlin**  
Re/insurance companies providing property, casualty, professional and specialty products, globally

<sup>1</sup>"Blockchain in insurance: applications and pursuing a path to adoption"

<sup>2</sup>"Blockchain technology as a platform for digitization"

# Better-working business across the insurance market

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Like other insurance markets, marine is weighed down by complex paper chains that prevent transparency, compliance and accurate exposure management. There is significant duplication of information across multiple parties, particularly regarding risk, exposure, premiums and claims. Companies rely too much on poorly integrated manual processes.

These problems can be overcome only when people work together to connect disparate data and processes and address the issues associated with reconciliation and error. But a fundamental obstacle limits such collaboration: nobody involved in an insurance process is working with the same set of facts.

Asset information is incomplete, out of date or unreliable at every point in the insurance process. Data is stored in ways that make it difficult to share. Data is not standardized and cannot be accessed securely. Because there's no common record of all transactions, there is no immutable audit trail. These factors can result in potential gaps in coverage and both underpayment and overpayment of claims. They can also create problems with billing and invoice reconciliation that generate unnecessary credit risks. It becomes harder for insurers, brokers and their clients to work together in ways that drive cost and capital efficiencies and – more importantly – growth.

The blockchain-enabled platform helps to address these structural issues. It connects clients, brokers, insurers and third parties to distributed common ledgers that capture data about identities, risks and exposures and integrates this data with insurance contracts.

Its capabilities include:

- ▶ The creation and maintenance of asset data from multiple parties
- ▶ Linkage of data to policy contracts
- ▶ Pricing or business process change based on information received
- ▶ Connecting client assets, transactions and payments
- ▶ Capture and validation of up-to-date first notification of loss data

Relevant beyond marine, the blockchain platform can be applied to any commercial or specialty line of business with high-value assets. The combination of distributed ledger technologies and blockchain is a practical way to provide organizations with real-time client, risk, exposure and claims data and, thus, can transform inefficient processes in any insurance market. It also confirms how blockchain can support a wide range of activities, create new ways to improve the service proposition for multinational clients, and address deep-rooted cost and profitability issues.

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**A fundamental obstacle to collaboration: nobody involved in insurance processes is working with the same set of facts.**

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**Blockchain can be applied to any commercial or specialty line of business with high-value assets.**



**The platform demonstrates how blockchain can give organizations real-time client, risk, exposure and claims data.**



## **How does blockchain make insurance work better?**

Blockchain facilitates the secure capture and sharing of data among chosen participants in real time with an immutable audit trail. This can drive the following benefits:

- ▶ Real-time decision-making becomes a reality as error-free data moves quickly from risk to capital
- ▶ Process fulfillment, enabled by smart contracts, is faster, more accurate, more consistent and cheaper
- ▶ The ecosystem uses a consistent, central dataset to assess losses quickly
- ▶ Automation of invoicing initiates settlement between all contracting parties and their financial systems
- ▶ Participants can innovate new services and products without traditional cost challenges
- ▶ Auditability of controls around contracts and better supports the multinational model



## Building the platform: real-world insights

### Questions we set out to test

- ▶ Can manual disparate processes be automated or eliminated?
- ▶ How smart do contracts need to be?
- ▶ Is it plausible to change insurance models by driving innovation?
- ▶ Is blockchain the right and sustainable choice for the future?
- ▶ What are the design considerations for a scalable solution?
- ▶ Which risks and issues are made more complicated?

The development of the platform revealed valuable insights about blockchain's application across the insurance industry.

#### **1 Blockchain can benefit everyone, but the ecosystem must actively commit.**

Blockchain can drive transparency of data between multiple parties. This transparency, combined with the use of smart contracts, can eliminate duplication of data and encourage automation across an ecosystem that has multiple participants, high transaction volumes and significant levels of reconciliation. The industry needs greater consensus around data standards to capture risk data, connect it to insurance contracts, and track and upload any changes to the data or the contract.

But the extent to which blockchain can do this depends on how well ledgers operate together and the ability of external systems to feed them accurate and consistent data. On top of these technical concerns, a supporting regulatory model will also need to be in place. Industry participants need to work together in this regard. The full benefits of blockchain will only be realized when leaders fundamentally re-think their organizations in terms of culture, skills, processes, inputs, outputs and KPIs.



## 2 Blockchain by itself will drive efficiencies, but smart contracts can disrupt.

Blockchain can support more process efficiency, but smart contracts offer a bigger potential value proposition. Such contracts use computer code to validate and execute commercial data and actions agreed by contracting parties. They can be useful in driving operational efficiencies and service quality by automating the “if x then y” parts of multiple, parallel traditional contracts.

Smart contracts could perform a series of services in one hit. Examples include:

- ▶ Improving multi-party consensus
- ▶ Automating execution on contracts and declarations
- ▶ Reconciliation of claimant, nature of claim, type of coverage and coverage limit

Beyond operational efficiencies, smart contracts fundamentally change the way transactions happen by executing end-to-end processes across multiple parties. However, smart contracts need accurate external data feeds and consistent syntax.

Building the necessary logic into the platform increases complexity. Smart contracts have the potential to deliver a number of benefits across the insurance process, but short-term benefits will be driven by data sharing and transparency.

## 3 Blockchain can foster innovation, but it will take time and investment.

Blockchain improves the accuracy and transparency of data and provides a platform for businesses to fundamentally change their models or develop new ones. It can create growth opportunities in existing and new markets, such as:

- ▶ “Pay-as-you-go” policies
- ▶ Products covering new risks, like cyber business interruption and employee benefit risk
- ▶ New bundled contracts and peer-to-peer payments

Blockchain can help the industry deliver the products clients and consumers want, while creating a more accurate lens on the price of risk. But blockchain-inspired innovation must be a long-term, collaborative effort. It will require sustained investment, genuine commitment from all parties, and a fundamental change to existing business processes, so that new models become possible.

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**It's essential that the infrastructure and supporting applications can be scaled, without any drop in performance.**

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# Building the platform: real-world insights

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## 4 Blockchain can help transform insurance, but it must have the right model.

Blockchain needs to be scalable and flexible, without any compromise on performance or security. It needs to work alongside the other technologies the business is using already. Thus, the industry will have to develop data standards.

**Security and data ownership:** the transparency of blockchain makes control over who has access to what data critical. With permission-based logic, ledger structure and access rules, people can view only the data they are allowed to see. For example, in a subscription-based model an insurer can see only its proportion of the risk, coverage, rates and premiums owed. Our platform helps this through interlinked private and public blockchains and permission-based access.

Once these permissions exist, it's important to establish a new set of business rules and processes. Client data should continue to be maintained and owned at the source, with all interested parties and associated processes notified automatically when something changes.

We have embedded this technology in a Microsoft infrastructure that has proven itself in all industries. It means we can provide the high levels of data integrity the industry expects, along with all the benefits of blockchain, at an affordable cost.

International bodies, such as ACORD, now need to work with the industry to develop a standardized data model. It needs to fit with local and international requirements and make certain that information flowing between ledgers and systems and any third parties outside the ecosystem is secure and consistent. The industry also needs to agree on standards and rules for processes, consensus, security and transport and transmission of data.

The integrity, structure and consistency of data on the ledger is of paramount importance. We chose to work with Guardtime, a distributed ledger technology company, because of its foundation experience with governments, telcos, automotives, and health organizations – realms where cyber-security risks have been fully tested. End-to-end encryption and use of KSI (keyless signature infrastructure) secure the entire model.

**Scalability:** the more participants that join the ledger, the greater the mutual benefits. So it's essential that the infrastructure and supporting applications can be scaled, without any drop in performance. Our platform underlines the need to avoid unnecessary complexity. This is especially true when it comes to deciding what's stored and executed on the ledger, which data or processes are executed off the ledger, and what type and number of ledgers are needed.

We found a ledger performs better when the documents and data needed to support off-ledger business processes, audit trails and workflow management are stored elsewhere – provided the consistency and accuracy of this data is guaranteed.

This approach helps to address concerns about the need to hold sensitive client data on the ledger, and the risk of using inaccurate data to drive business process decisions. When a decision is made, a copy of the data used is time-stamped and can be retrieved at any point if it is needed to validate the decision. It can be worth creating separate ledgers to support core business functions across asset, contract, reinsurance and billing. These can be hosted on one platform or separately.

To automate processes on the ledger, transactions must be validated quickly. So it's important to define clearly the consensus model, the actors involved, and their responsibilities, along with the offer and acceptance processes that support this.



## Building the platform: real-world insights

**Co-existence with IT platforms:** many insurance industry players lack a modern IT infrastructure. But, whatever they are working with today needs to co-exist with blockchain, so that operational processes and systems can be integrated. This is both a technical and business consideration.

As critical as the ledger is in driving benefits resulting from a single, shared version of the truth, the full scale of benefits can be achieved only when blockchain is used to drive automation through off-ledger processes, reporting, audit and compliance.

### 5 Blockchain mitigates some risks, but opens the door to new challenges.

Blockchain can mitigate risks across the value chain – including the risk of fraud, compliance failure, errors and omissions, and poor customer service. But it can complicate risks in a number of areas. This is because multiple parties in multiple jurisdictions – from ship and cargo owners to surveyors and port authorities – must align around a single insurance contract.

To manage these risks, it's important to define strict controls and governance measures and to consider legal options and the potential for jurisdictional challenges.

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**Limiting the number of participants involved in validating each transaction will help to optimize performance and efficiency.**

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**6 Blockchain can help the industry respond to the regulatory agenda, but regulators must be involved from the start.**

The great strength of blockchain – its ability to create a single version of the truth – could also become a source of systemic risk, if truth becomes falsehood. There must be clear controls around what data organizations are storing and what data participants have permission to use. When driving automation, it must be clear what – if any – degree of process failure is tolerable, and how clients and other blockchain participants are protected from the effects of any failure. To move forward with confidence, and to capture the full benefits of blockchain, it is essential that industry participants actively involve regulators in these questions.

Blockchain creates transparency, security, immutability and data standardization – all of which will be of interest to industry regulators around the world. In a blockchain-enabled insurance industry, participants and regulators would be in a stronger position to deal with issues such as cost, capital adequacy, conduct risk, compliance, taxation, and the Senior Insurance Managers Regime.

But as blockchain solutions change how the insurance industry does business, there will be new practices and processes that regulators will want to look at closely. These range from how privacy is protected to the location and timing of transactions. Any technology that involves extensive data sharing and cross-jurisdiction transactions will create issues around privacy, security and governance. There are proven ways of dealing with these concerns.



# EY and Guardtime are building the blockchain-enabled platform in association with insurance and technology leaders.

“Our solution is the first to deliver blockchain’s transparency, security and standardization to marine insurance and is ready for commercial use.”

**Shaun Crawford**  
EY Global Insurance Leader

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“This first-of-a-kind effort has the potential to dramatically reduce time, cost and risk across the entire insurance value chain.”

**Bill Pieroni**  
President and CEO of ACORD

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“This successful proof of concept is groundbreaking.”

**Martin Henley**  
CIO of XL Catlin

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“We started with an intuitive belief that blockchain technology could transform the marine insurance market. We are excited that we are already in a position to test a practical platform through which we will be transacting business in a completely new way.”

**Dr. Paul Taffinder**  
Director of Strategy & Innovation, MS Amlin

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“The KSI blockchain stack is a proven technology for securing the physical, software and information supply chains that businesses rely on.”

**Mike Gault**  
CEO of Guardtime

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“It is a priority for us to leverage technology to streamline and automate our interaction with the insurance market. Insurance transactions are currently far too tedious and frictional.”

**Lars Henneberg**  
VP, Head of Risk & Insurance of A.P. Moller-Maersk

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“Microsoft believes blockchain is a transformational technology with the ability to significantly reduce the friction of doing business, especially streamlining business processes shared across multiple organizations.”

**Mark Russinovich**  
Chief Technology Officer, Microsoft Azure

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“Redesigning the insurance process is critical for the evolution of our industry. This initiative has the potential to streamline and simplify insurance transaction efficiency using new technologies, an essential development for the insurance industry.”

**Simon Gaffney**  
Chief Data Officer, Willis Towers Watson

# Benefits of the platform

Improves compliance, controls, data traceability

Improves claims notification and assessment, with less fraud and claims leakage and faster, more accurate payments



Focuses on new business models to drive better client service and better outcomes for clients

Creates new and significant opportunities to strip out pre-sale and post-sale costs and provides financial data to facilitate the billing and collection of premiums

Improves internal capital allocation

Connects the complete value chain, to support enhanced value-added services from broker to insurer to the corporate client and their customers



Brings transparency and consistency to reporting, with reduced errors and omissions and better portfolio analytics

Facilitates behavioral change triggers to warn, avoid, prevent and respond far quicker to incidents and actions that could create significant business disruption and loss

# Making insurance better for everyone

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With a group of collaborators who collectively provide the essential blockchain capabilities, EY and Guardtime are leading the development of a working blockchain platform for marine insurance, addressing key questions around future adoption in other parts of the industry.

This is an important step in the move from concept to reality. We have demonstrated that blockchain can address deep-rooted problems across every part of the insurance industry in ways that other technologies cannot. As a platform component, it needs to co-exist with other technologies as part of a considered strategy. While it can make the industry more efficient, and create new opportunities for innovation and profitable growth, it needs collaboration and co-existence.

Blockchain can help to transform the insurance industry in ways that benefit everyone, but it does not solve every challenge. Even where it can make a transformative difference, there are still many technical, legal, regulatory and cultural issues to address. Any technology that by definition involves people working together in a climate of mutual trust and collaboration will always take time to implement. But we believe these barriers can be resolved.

The industry players that are working together on the platform – all respected, established, industrial-strength organizations – represent the ideal group to take blockchain forward.

Guardtime has capabilities, experience and products that solve a number of the engineering problems other vendors are facing around security and scalability. Its products are proven in industries that have much higher transaction levels and security requirements.

Microsoft provides the enterprise-scale platform and global trust model that sits behind the platform. It's a trusted brand for data hosting and enterprise services and has strong relationships with insurers around the globe. ACORD, the insurance industry standards body, has played a critical role in driving standardization of services, processes, and data specification for blockchain technologies across the industry.

EY is the organization that provides the framework to deal with the complexities associated with the integration and adoption of blockchain technology. We have defined the business model and the related issues on standards, compliance and regulation. As an independent, trusted and well-connected advisor, we believe EY is ideally positioned to help the insurance industry embrace the benefits of blockchain-enabled solutions, while avoiding the many roadblocks that will appear along the way. We understand the business challenges. We have the technical knowledge. We have created the new business process models. And we can align regulatory, legal, technological and cross-industry participants. The emergence of this blockchain platform clearly demonstrates why it is an exciting time for the insurance industry.

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**Learn more at [ey.com/insurance\\_blockchain](https://ey.com/insurance_blockchain)**

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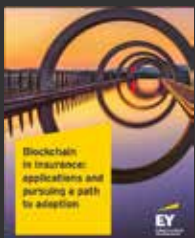
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## Further reading



*Blockchain in insurance:  
applications and pursuing a  
path to adoption >*



*Blockchain technology as a  
platform for digitization >*

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