
Title Insurance Transformation: From Risk Prevention to Risk Assumption, Powered by Blockchain

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Abstract

Title insurance, which focuses on mitigating risks associated with past property ownership, plays a crucial role in real estate by providing secure and timely ownership transfers. Unlike other insurance models that anticipate future risks, title insurance covers the past of the property. It relies on labor-intensive title searches to uncover issues. This could also be referred to as a warranty provided for a superior craftsmanship of “Title Search”. This warranty is applicable till the ownership of the property is retained by the insured. The issues faced by title insurance companies range from fraud, liens, and record errors, resulting in an expense ratio averaging 90% for insurers. This paper proposes an application of blockchain technology to transform title insurance through immutable, distributed ledgers that enhance transparency, reduce fraud, and streamline processes. The approach facilitates a paradigm shift from risk prevention to risk assumption, enabling insurers to leverage prior title searches for cost-effective risk sharing. Addressing challenges like initial investment and compliance with regulations. This work covers blockchain’s potential to revolutionize title insurance, fostering a secure, cost-efficient real estate ecosystem, with future integration of AI-driven fraud detection as a promising next step. This paper presents a business model that involves risk transfer in exchange for profit sharing, thereby converting a warranty service into an insurance product. Ultimately, this paper provides a recommendation of how to move from Risk Prevention to Risk Assumption.

Keywords - Title Insurance, Blockchain, Distributed Ledger Technology, Risk Prevention, Risk Assumption

1. Introduction:

Title Insurance is the only insurance that covers the past, in contrast to all other insurances that cover your future. This is because Title Insurance focuses on risk prevention, whereas others focus on risk assumption. Like any other insurance Title Insurance also provides coverage to the insurer against title fraud(s), unpaid property taxes, and forgery. This process is conducted as part of closing this house, and there is just one time premium that is paid to title insurance. This one time premium is also contrary to any other insurances, where the premiums are paid at a given time frequency. Title Insurance is the only insurance that covers your past that means it is easier to cover it and be

“almost” certain that there could be no fraud claims being filed. And to provide this type of concrete assurance, Title has to be searched, cleared and filed within a given time before closing of the house. That means, it is time pressure along with vast history to be validated. The combination of these two dimensions makes title searches expensive, resulting in a major allocation of costs by title insurance companies towards title searches and clearance. It starts from the buying commitment, and the entire house buying revolves around title search and insurance. Mortgage is also an essential part of the overall process, but that could be done as part of the pre-approval (s), and could be built on pre approval (s). This makes title insurance crucial for a timely closing and smooth ownership transfer of the property. This search is a very human labor intensive process.

On the other hand, new technologies are gaining a lot of press and momentum solving many human labor intensive complex problem(s). One of them is Artificial Intelligence (AI). AI is great to be an assistance and ease the labor intensive work. In the future it has the potential to even replace humans, but technology advancement till date is not that far to confidently replace a human. AI enables faster results but is time consuming for better accuracy of the actions taken.

There is another technology that has seen its hype but has not been used to its true potential, that is Blockchain technologies. Blockchain is often discussed interchangeably with Bitcoin, but Bitcoin is just one of the many use cases of Blockchain implementation. Blockchain provides an option to create tamperproof immutable ledgers that could be distributed across various participants that ensure the integrity of the data.

A blockchain consists of scripts that perform tasks of entering and accessing information saved in the database (Pooja Shrivastav & Manju Sadasivan, 2023). It is distributed, that means it is multiple copies of the same datasets on many isolated systems, and the data must match to ensure the authenticity of the data committed/stored. For example, Bitcoin collects transaction information and enters it into a 4MB file tagged as a BLOCK. Once the block reaches this threshold, the block runs through a cryptographic algorithm to create a block header. This encrypted block header is then pulled into the following block along with the other information, creating a chain of Blocks, this the name “Blockchain”. This structure ensures that the entire chain's integrity is maintained, and once a block is added, it cannot be changed, this provides immutability. Remember, the size of the block depends on its application.

By implementing Blockchain in Title Insurance the chances of fraud in property title will drop significantly. As once the property is added to the block and updated in all the distributed ledger, it becomes immutable, thus secure, safe and transparent.

The following sections offer a more in-depth examination of how these two concepts can complement each other. Along with how the Title insurance can transition from Risk Prevention to Risk Assumption.

2. Literature Review:

Before the first title insurance company was created in 1876 locals with knowledge of the land known as “conveyancers” would provide some of the same basic services, such as title searches, and give a certification that a title was clear of any issues such as an existing lien. However, without a

title insurance policy backing this certification, buyers were liable for damages that arose if conveyancers were incorrect due to an undiscovered issue. The 1868 Pennsylvania Supreme Court Case *Watson v. Muirhead* exemplified this problem, and it led to the development of title insurance. (<https://www.alliancetitle.com>, 2022).

The objective of title insurance has remained the same for over 150 years – to help parties in real estate transactions determine their rights and interests, and ensure that land transfers are expeditious and secure. Protecting the parties involved in real estate transactions is the reason the title insurance product was developed. Before a transaction of house ownership is completed, a title search of the records is conducted to identify potential issues that can be rectified, allowing the transfer to proceed (Chawla & Kumar, 2021). While most problems can be identified through a title search by skilled professionals, there may be hidden hazards that even the most thorough search will not reveal. Title fraud examples include:

- forgeries in the chain of title
- a claim by a previously undisclosed relative of a former owner
- a mistake in the records.

Liens, easements, rights-of-way, life estates, air and subsurface rights, and future interests are also found in a title search. Title insurance is substantially different than other types of insurance coverage, which can often lead to a misunderstanding of the product. Title insurance emphasizes risk prevention rather than risk assumption. This emphasis on risk prevention is a labor intensive and costly component of doing business, but the coverage offers the best possible opportunity for avoiding claims and losses in real estate transactions.

Approximately 25 percent of all residential real estate transactions have issues with the title – issues that are resolved by title professionals before closing. This emphasis on loss prevention results in fewer claims paid by title insurers compared to other lines of insurance. However, loss prevention and clearing title issues is a labor-intensive and costly component of a title company's operating budget. To compare, the expense ratio for title insurers averages 90 percent, while the expense ratio for property and casualty companies is less than 30 percent (<https://www.alta.org/press/titleinsuranceoverview.pdf>).

Therefore, it'll be a great boon for title insurance companies to reduce this expense by using the right tool and technology.

On the other hand Blockchain, is a proven technology that enables immutable ledger(s) that are distributed. Distributed ledger technology (DLT) is the foundation of blockchain. DLT offers a consensus validation mechanism through a network of computers that facilitates peer-to-peer transactions without the need for an intermediary or a centralized authority to update and maintain the information generated by the transactions (Yadav *et al.*, 2021). Each transaction is validated and, along with a group of validated transactions, is added as a new “block” to an already existing chain of transactions, giving rise to the name “blockchain.” Once a transaction has been added to the chain, it generally cannot be altered or removed.

There are two types of blockchain networks:

- **Permissioned blockchains:** These networks are proprietary, allowing specific individuals or entities to conduct transactions (such as a group of banks processing financial transactions).
- **Permissionless or public blockchains.** These are open source networks that anyone can access and use (such as bitcoin users who transact with each other using bitcoin for payment). Unlike the bitcoin blockchain and other public networks, permissioned blockchain networks are typically developed by companies for their own private commercial use.

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Permissioned blockchain is discussed further to enable major title insurance providers to form a consortium to provide better services to the end users, and move away from risk prevention.

3. Research Gaps and Novelty aspect:

There is still a gap in this specific area, it is around the percentage savings of expense ratio and the initial investments to build the distributed ledger across all the participating Title Insurance organizations. This study doesn't cater to small scale Title Insurance Providers.

This communication focuses on leveraging Blockchain Distributed Ledger Technology across major Title Insurance providers to reduce their expense ratio and moving from risk prevention to risk assumption in the consortium (Thakur, 2022).

4. Tools recommended :

- Amazon Web Services (AWS) Managed blockchain
- Quorum
- API Gateway - AWS API Gateway
- OAuth 2 provider - AWS Cognito

5. Title Insurance:

Title Insurance in a nutshell is an assurance provided to already burdened property buyers ensuring their ownership on property is clear and that no one else can claim the ownership.

A property title isn't a document; it's a concept used to establish a property owner's "bundle of rights."

Bundle of rights

The bundle of rights encompasses all of the rights that come with being a property owner. It means you have the right to:

- Possess the property (Right of Possession)
- Use the property (Right of Control)
- Enjoy the property however you wish (Right of Enjoyment)

- Sell, rent or transfer ownership (Right of Disposition)
- Limit who can enter the property (Right of Exclusion)

These rights may be limited by the laws, easements or liens on the property or homeowners association (HOA) rules. While you generally have the right to use your property as you wish, your HOA might restrict certain activities. (<https://www.rocketmortgage.com/learn/house-title#:~:text=By,you%20have%20the%20right%20to:>)

Title Insurance is not mandated by law, but the lender mandates the title insurance for the loaned amount, but it is advisable by Consumer Financial Protection Bureau (CFPB) to get the title insurance for the amount of the property price paid. (<https://www.consumerfinance.gov/ask-cfpb/what-is-owners-title-insurance-en-164/>)

A Typical “Title Insurance” process flow Flow of current Title Insurance

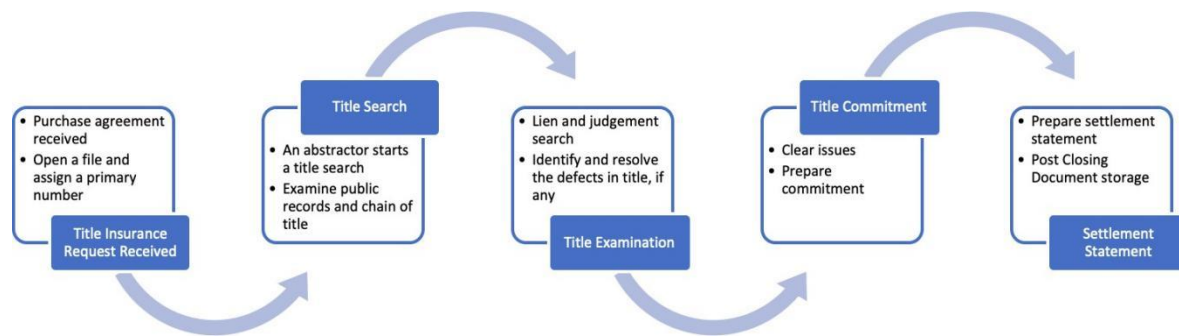


Figure 1. A typical title insurance business flow diagram.

Stage 1: Order Intake and Initiation

- The process begins when the title company receives a purchase agreement, loan application, or title request from a lender, realtor, or buyer.
- A file is opened, and a file number is assigned to track the transaction.

Stage 2: Title Search

- An abstractor begins a title search by examining public records.
- The search includes:
 - Chain of title:** A history of the property's ownership to ensure it has been conveyed properly.
 - Tax search:** Determines the status of real estate taxes and identifies any outstanding balances.
 - Easement and encroachment search:** Identifies any rights-of-way, encroachments, or easements that could affect the property's use.

Stage 3: Title examination:

- A title examiner reviews the results of the search to identify any defects on the title.

- Uncovers any unsatisfied judgments, liens (including mechanic's liens), and other outstanding debts against the property.

Stage 4: Title Commitment

- Clear issues:** The title company works to resolve issues or "clear the title." This may involve contacting parties to resolve outstanding liens or require the seller to pay them off at closing.
- Prepare commitment:** Once the title is deemed insurable, the company prepares a title commitment, or preliminary title report. This document details the conditions under which it will issue a title insurance policy.

Stage 5: Settlement statement

- Prepare settlement statement:** The title company works with the lender to prepare the settlement statement, such as a Closing Disclosure (CD), which itemizes all funds and costs for the closing.
- **Arrange closing:** The title company schedules the closing time and location for all parties to sign the final documents.
- After the county recorder's office returns the recorded documents, the title company confirms that all releases have been filed, and the title is clear.

The maximum time is spent in the entire lifecycle of Title Insurance is with Title Search, which enables the insurance organization to ensure that there hasn't been any dispute on the property, there is no cloud on the property in the foreseeable future, thus marking the property as clear.

6. Blockchain:

Blockchain is a technology that enables the secure sharing of information (Dong *et al.*, 2023). Data is stored in a database. Transactions are recorded in an account book called a ledger. A blockchain is a type of distributed database or ledger, which means the power to update a blockchain is distributed between the nodes, or participants, of a public or private computer network. This is known as distributed ledger technology (DLT). Nodes are rewarded with digital tokens to make updates to blockchains.

Blockchain allows for the permanent, immutable, and transparent recording of data and transactions. This, in turn, makes it possible to exchange anything that has value, whether that's a physical item or something more intangible (<https://www.mckinsey.com/featured-insights/mckinsey-explainers/what-is-blockchain>).

Blockchain is prevalent because traditional database technologies present several challenges for the integrity of the recorded transactions (Paul *et al.*, 2021). In this case, consider the sale of a property. Once the money is exchanged, ownership of the property is transferred to the buyer. Individually, both the buyer and the seller can record the monetary transactions, but neither source can be trusted. The seller can easily claim they have not received the money even though they have, and the buyer can equally argue that they have paid the money even if they haven't.

To avoid potential legal issues, transactions must be supervised and validated by a trusted third party. The presence of this central authority not only complicates the transaction but also creates a single point of vulnerability. If the central database was compromised, both parties could suffer.

Blockchain mitigates such issues by creating a decentralized, tamper-proof system to record transactions (Zarrin *et al.*, 2021). In the property transaction scenario, blockchain creates a separate ledger for each buyer and seller. All transactions must be approved by both parties and are automatically updated in both parties' ledgers in real-time. Any corruption in historical transactions will corrupt the entire ledger. These properties of blockchain technology have led to its use in various sectors for ensuring data authenticity and integrity (<https://aws.amazon.com/what-is/blockchain/>).

7. Blockchain Implementation in Title Insurance:

The real power of Blockchain is not in creating the chain of immutable blocks, rather is in a “Distributed” nature of the ledger. This is the same distributed ledger technology heavily leveraged in Bitcoin, and other popular implementations of Blockchain.

As per the survey published in September, 24, 2025 by American Land Title Insurance (ALTA) the title insurance industry generated \$4.5 billion in title insurance premiums during the second quarter of 2025 according to ALTA’s latest Market Share Analysis.

Top 10 Individual Underwriters by Market Share:

- First American Title Insurance Co., 22.9%
- Fidelity National Title Insurance Co., 15.0%
- Old Republic National Title Insurance Co., 13.8%
- Chicago Title Insurance Co., 13.3%
- Stewart Title Guaranty Co., 10.7%
- Westcor Land Title Insurance Co., 3.9%
- Commonwealth Land Title Insurance Co., 3.4%
- Title Resources Guaranty Co., 3.1%
- WFG National Title Insurance Co., 2.6%
- First National Title Insurance Co., 1.2%

This means that top 10 providers of title insurance are constituting 89.9% of the market. (<https://www.alta.org/news-and-publications/press-release/ALTA-Reports-Q2-2025-Market-Share-and-Title-Insurance-Premium-Volume>) That means, if these 10 providers form a consortium to build a distributed ledger, where every of these players has a node allocated to them. Each node holds a copy of the ledger, and when a new transaction is added, it is copied and synchronized across the entire network. This will be part of a “Permissioned blockchains” network, completely closed groups of entities maintaining and owning it.

A block in this chain should be considered an address. Each and every time an ownership of the land or property is transferred from one to another entity, the block must be updated, synced across

nodes, and the title insurance provider must be updated in the records as well. Forming the main chain of title insurance providers.

In the next evolution of this chain, every county should be asked to participate, forming a Sidechain. The main-chain has some drawbacks like limited block sizes, poor efficiency, and low throughput. To address all these problems, sidechains were developed. They support the expansion, efficiency, and scalability of a blockchain network. Through a two-way peg, they are connected to the parent blockchains. Sidechains were developed to also address the crucial speed issue that the cryptocurrency industry was facing. They help to make calculations easier while maintaining the same level of security as the main blockchain. Despite having independent nodes, they function by attaching their own nodes to the mainchain that is already in place.

One of the main advantages of sidechain technology is that it makes transactions happen more quickly. This technology helps the blockchain address scalability difficulties. Processing efficiency improves as operations are split over each sidechain, and depending on the desired use case, key features like speed and computational power are readily available (Balani *et al.*, 2022). These qualities have led to the widespread usage of sidechain technology in several industries. (<https://medium.com/@superexnigeria/what-are-mainchains-crosschains-sidechains-and-the-consortium-chains-b8472edf0d9>).

Once the side chains are created per county, the cost of title search would go down significantly. And once 100% adopted, the expense ratio has a potential to even go down upto 5% from the current 90%. But this will take time for adoption and participation. During participation the top tier providers might have to work with counties, invest in the technology before getting the reward, therefore there will be a bell curve of expenditure before the cost of title search reduces significantly. This is illustrated in the graph below.

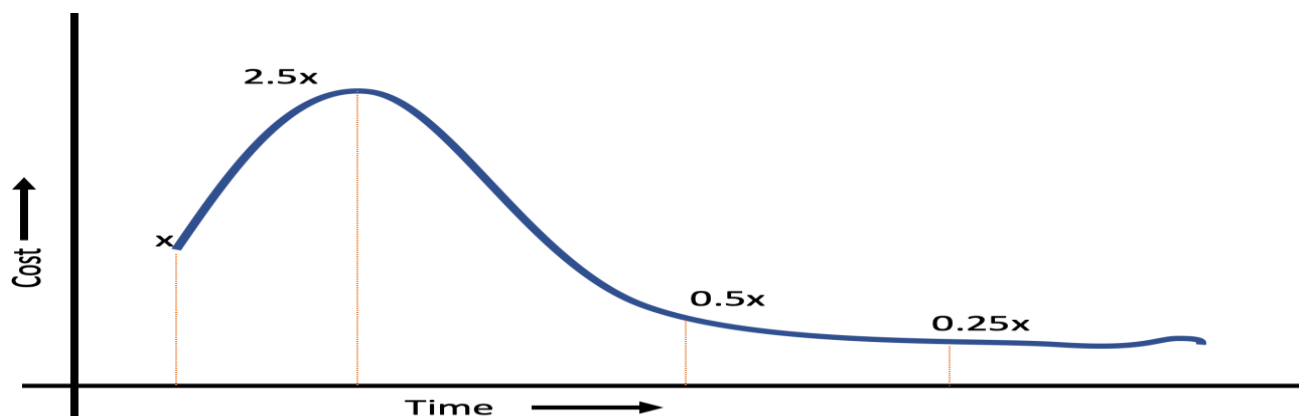


Figure 2. The amount of investments required to build a chain with an equal percentage of market share by the participating members of the consortium

8. Moving from Risk Prevention to Risk Assumption:

As mentioned earlier, this title insurance business is akin to a warranty provided for the services rendered during the closing cycle. Very similar to buying a car, with the difference that the

car warranty comes with an end date, and Title Warranty is lifelong under single ownership. That is where this type of insurance is often referred to as “Risk Prevention”.

After forming a consortium, the titles and the insurance providers are updated in the block forming chain. The earlier provider will also be visible, now the new potential title provider can reach out to the earlier provider to share the risk, and the reward.

The seller of the property will already have a Title Insurance tagged to their property, that means the data of Title Search is already available by the current insurance provider, along with the risks associated with the property’s title. The details will be all available on the block which is now ready to add more details to it (Woody *et al.*, 2024). By default, the buyer’s Title Insurance provider will have to start the same title search which is already accomplished by the seller’s title insurance provider. So, instead of doing the search again, the buyer’s title insurance provider can request the sellers’ title insurance provider to share the Title Search results, and risk factor. Now, the buyer’s title insurance provider can ask the sellers’ provider to share the risk percentage in lieu of the percentage of title insurance.

Sharing the prior title insurance details on the chain isn’t challenging. The seller’s provider has to share the public key with which the buyer’s provider can access the details on the chain that were encrypted by the seller’s insurance provider. Here the power of block chain is that the sellers’ provider can go back in the chain and see who was the original title provider and directly seek the risk from the first title insurer of the property in way less cost.

- Let us assume the prospective title insurer is: N
- The current title insurer is: M

Now, M would have already conducted the search, cleared the title, and established ownership of the current property. Now if N reaches out to M offering to buy the risk of title insurance which has been already owned by M. For example - N is planning to make a revenue of \$100 on the deal. As explained earlier, the expense ratio, the profit for N will be \$10. So, instead of spending \$90 on search, N can offload 50% of risk to M, requesting access to the search conducted by M. Share \$50 with M. And does some additional verification with \$10 on the property before insuring.

With this transaction, company N would have spent \$50+\$10 as an expense and still make \$40 as a profit, rather than \$10 by doing the entire title search by itself.

9. Conclusion:

The U.S. title insurance industry, a **\$16 billion market**, still relies heavily on repetitive manual title searches and risk-prevention practices that drive expense ratios close to 90%. Blockchain technology provides a clear path forward — shifting the model from duplicated effort to shared risk. By storing verified title records on a permissioned blockchain distributed and managed among leading title insurers, who already control nearly 90% of the market. Future insurers can instantly access validated historical data instead of recreating them from scratch. This change transforms a costly, one-time search into an asset that can be **reused** and **traded**, much like a financial commodity.

Insurers could move from spending **\$90 to earn \$10 profit** today, to spending \$60 for the same transaction — effectively increasing their margins by fourfolds. When scaled across the industry, this shift could reduce the expense ratio to as low as **5–15% over the next five to seven years**, generating an estimated \$6–8 billion in savings. These savings can offset the initial investment required to build and maintain blockchain infrastructure on platforms such as AWS Managed Blockchain or Quorum.

The incentives are aligned as early adopters gain the most, creating momentum towards collective participation once a critical mass of the market joins the network. Smart contracts built into the blockchain ensure accountability by releasing payments only when the title data is independently verified, keeping moral hazard in check.

Regulatory oversight also encourages innovation. The upcoming FinCEN Anti-Money Laundering Rule (effective December 1, 2025) requires greater

transparency in all-cash real estate transactions. Blockchain’s built-in audit trail makes compliance easier and cost efficient, turning a regulatory challenge into a strategic advantage.

The upfront investment will spike—maybe \times normal for the initial couple of years

— before the curve bends down (see Figure 2). The curve peaks before long-term savings emerge, and counties must carefully design validation rules for their

sidechains to balance speed and legal certainty. Integration with older, paper-based records will require phased digitization efforts.

Successful pilots in Sweden and Georgia showcase that these challenges can be overcome. With continued collaboration and county-level participation, the U.S. could achieve full adoption within the next decade. The next evolutionary layer integrates AI-driven anomaly detection on top of the immutable ledger: predictive models trained on historical curative events (**36 %** of transactions require non-routine fixes (<https://www.alta.org/media/pdf/240506-ALTA-Curative-Study-Executive-Summary.pdf>)) can flag defects pre-closing, further reducing loss ratios. Global case studies (e.g., Dubai’s Real Estate Blockchain) could be commissioned to benchmark sidechain performance at scale. Ultimately, blockchain is not just another digital tool for title insurance; it redefines the foundation of trust. It turns an industry built on defensive duplication into one powered by cooperative data sharing, unlocking billions in value while strengthening the reliability of America’s \$40 trillion property market.

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