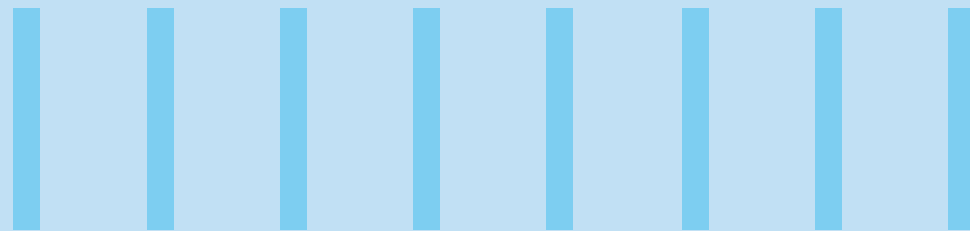


FUTURE OF CONTRACTING: SMART CONTRACTS

A man's 'original and natural right' to make all contracts that are 'intrinsically obligatory,' and to coerce the fulfillment of them, is one of the most valuable and indispensable of all human possessions.

- Lysander Spooner



Abstract

Contracts are the atomic unit of commerce, the foundation of all economic activity and business processes. Nonetheless, contracts are also one of the least protected assets of an organization, sometimes leading to revenue loss due to a lack of focus on contract management. The times are, however, changing, and more and more organizations are looking for ways to manage contracts efficiently and professionally. Contract management has evolved over the years from paper contracts in boxes to document management tools, and then to digitization and automation, and finally to smart contracting now. This paper discusses how contract management has evolved over time, the key trends that corporations are following in contract management, and what the future holds.



What is contract management and why is it necessary?

When two organizations wish to do business with each other, a contract specifies the undertakings entered by each organization and the terms and conditions under which they will fulfil

their obligations. When a contract is phrased poorly, organizations might lose countless amount of money over minor technicalities. Effective contract management can help build a powerful

business relationship among the involved parties and pave the way to greater profitability over the long term, but only when it is managed correctly.

Current scenario in contract management

Contract lifecycle management (CLM) systems are being used by organizations to solve the manual challenges associated with contract management. Contract management technologies backed by artificial intelligence can also take risk management, clause drafting, and analytics to the next level. A clause library can enable teams to centrally store contract

templates and pre-approved provisions that can be accessed from anywhere, allowing contracts to be executed remotely and fostering a remote working style. These changes to the contract management process resulted in:

- Increased efficiency
- Low operational cost

- Faster revenue generation
- Better customer service
- Improvement of digital skills
- Improvement of metrics, reports, and qualitative results
- Efficient usage of the available bandwidth of resources

Blockchain: an introduction

A blockchain is a decentralized network which is distributed in nature. It records transactions in a transparent and secure manner. A network of nodes validates

and analyzes each block in a blockchain, making sure the information on the blockchain remains secure and accurate. Blockchain is used in current markets for

a variety of reasons and activities, with cryptocurrencies and crypto exchanges being some of the most prominent.

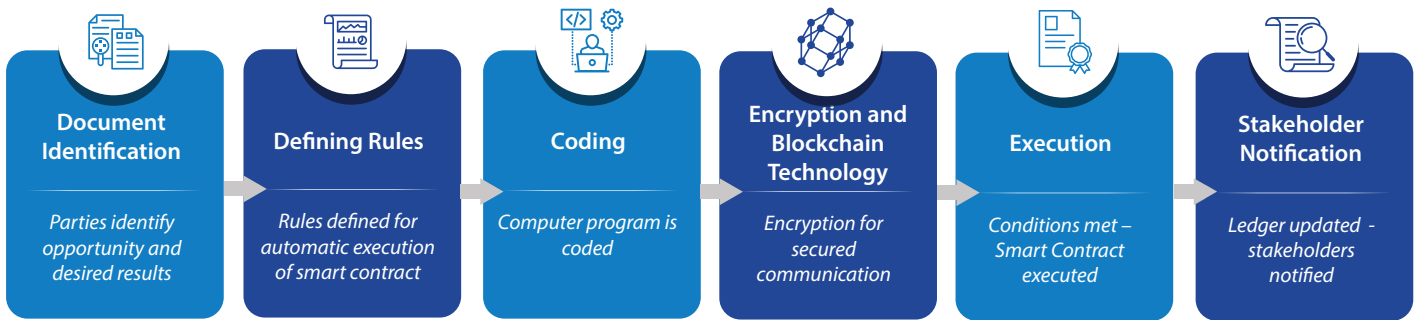
What are smart contracts and their legal applications?

One of the remarkable features of the blockchain technology is the ability to create self-executing smart contracts, with the terms and conditions of the agreement embedded into its code. Smart contracts

were first used by Nick Szabo, a computer scientist, legal scholar, and cryptographer. His idea was to use a distributed ledger to store and execute contracts. Execution of smart contracts can trigger financial

transactions, provision of services, unlocking of digital content controlled by a digital rights management, and more.

IMPLEMENTATION OF SMART CONTRACT



Key features of smart contracts

Here are some important features of smart contracts.

- They are immutable by nature, which means they cannot be modified after creation; hence, nobody tampers with the contract's code. It provides a secure ledger for recording a series of transactions.

- Single version of contract data, visible to both the parties, builds trust and eliminates fraud.
- They are stored and executed on decentralized networks.
- They are distributed by nature, which means that the output of each contract

is validated by all parties on the network.

- A transaction does not need the physical submission of any documents.¹
- Near real-time visibility into partner performance metrics.

Smart contract legislation across the globe

Regulations for smart contracts are still in a nascent stage around the world, with countries taking various approaches.

- **USA:** Almost 47 US states enacted the Uniform Electronic Transactions Act

(UETA) in 1999. The UETA established guidelines and standards for contracts in electronic form, corresponding records, and signatures. The Act states that electronic contracts are legitimate and

electronic signatures are valid in providing contractual consent. For example, Arizona now recognizes legal sanctity of smart contracts² and California allows marriage licenses to be issued via blockchain

¹Bhardwaj, Chetna. "What Are Smart Contracts and Are They Legal in India?" India Briefing News, 25 June 2022, <https://www.india-briefing.com/news/what-are-smart-contracts-and-are-they-legal-in-india-25343.html/>.

²Neuburger, Jeffrey. "Arizona Passes Groundbreaking Blockchain and Smart Contract Law – State Blockchain Laws on the Rise." New Media and Technology Law Blog, 23 Feb. 2021, newmedialaw.proskauer.com/2017/04/20/arizona-passes-groundbreaking-blockchain-and-smart-contract-law-state-blockchain-laws-on-the-rise.

technology³. The Securities and Exchange Commission (SEC) has also indicated that certain types of smart contracts may be considered subject to federal securities laws⁴.

- **Europe:** The Rome I Regulation governs the legitimacy of all civil and commercial transactions in the European Union (EU). The European Securities and Markets Authority (ESMA) has formulated and issued guidelines regarding the usage of smart contracts in the securities market.

- **United Kingdom:** The UK Law Commission has begun research on reforms that would make smart contracts on blockchains legally clear.

- **Asia:** In Asia, Singapore has established itself as a hub for blockchain innovation, and Japan has taken a more proactive

approach to regulations with the introduction of a licensing system for cryptocurrency exchanges⁵.

- **India:** Nothing in the Indian Contracts Act, requires that the contract be in writing or that a signature be in any specific format. As a result, smart contracts may be regarded legal under this provision⁶. According to Sections 5 and 10 of the Indian IT Act, “digital contracts are valid contracts and enforceable in court.” They should, however, bear the electronic or digital signature of the certified authority approved by the government body. As a result, smart contracts violate this rule because they are decentralized and do not include any government entity or agency. According to the Section 65B of the Indian Evidence Act, “electronic

contracts are admissible in a court of law.” However, these contracts must contain a proper digital signature from a certified government entity to confirm their authenticity. This, once again, runs counter to the requirements of a traditional contract. Thus, there are provisions in the Contracts Act, the Evidence Act, and the Information Technology Act that can be used with blockchain technology and smart contracts. Yet, because current rules have not been updated to match recent technical changes, they impose constraints on the usage of smart contracts.



³Fisher Phillips. “What Employers Need to Know as California Passes New Blockchain Law but Declines Broader Regulation – for Now.” Fisher Phillips, www.fisherphillips.com/news-insights/california-passes-new-blockchain-law-declines-broader-regulation-for-now.html.

⁴Fisher Phillips. “What Employers Need to Know as California Passes New Blockchain Law but Declines Broader Regulation – for Now.” Fisher Phillips, www.fisherphillips.com/news-insights/california-passes-new-blockchain-law-declines-broader-regulation-for-now.html.

⁵Lim, Caroline, et al. “A review of fast-growing blockchain hubs in Asia.” The Journal of the British Blockchain Association (2019).

⁶Bhardwaj, Chetna. “What Are Smart Contracts and Are They Legal in India?” India Briefing News, 25 June 2022, <https://www.india-briefing.com/news/what-are-smart-contracts-and-are-they-legal-in-india-25343.html/>.

Procedure to execute a smart contract

Smart contracts work by encoding simple “if/when...then...” instructions into blockchain code. This procedure is divided into three steps, which are as follows:

• **Coding:** The code performs a predefined function and is collected, authenticated,

and performed on a blockchain network.

• **Transaction:** As a transaction progresses, a copy of the transaction is distributed among all parties.

• **Execution:** When a transaction is finished, this network of parties updates the blockchain.

Use of Smart Contracts

The following areas are currently using the blockchain technology for executing smart contracts:

- Trading
- Records storing
- Supply chain management
- Real estate

- Mortgage
- Copyright claim
- Insurance
- Escrow

As the technology continues to advance, it is probable that we will see further adoption of smart contracts in other

areas. Many multinational organizations have already jumped on the blockchain bandwagon and are working on their own projects to stay ahead of the game. Big technology companies like Microsoft and IBM are offering blockchain solutions to enterprise clients.

Smart contracts usage across globe

Here are a few examples of the usage of smart contracts across the globe.

• **Supply chain management:** Tata consultancy Services (TCS) and Wipro are experimenting in the supply chain management, digital identity verification and financial services.

• **Digital Identity:** The Estonian government’s e-Residency program utilizes smart contracts to securely manage digital identities, allowing citizens and e-residents to access government services, open bank accounts and sign documents digitally, streamlining processes and reducing bureaucracy.

• **Intellectual Property Rights:** Ujo Music, a European platform, leverages smart contracts to automate the distribution

of royalties and licensing fees to artists, ensuring fair compensation and reducing disputes over intellectual property rights in the music industry.

• **Healthcare:** Apollo Hospitals is exploring smart contracts usage for medical records management and patient data sharing.

• **Automated Contract Creation:** Platforms like OpenLaw and Clause.io use smart contracts to streamline the process of contract drafting, negotiation and execution by automating the creation of customizable legal agreements, reducing the time and effort spent by legal professionals.

• **Legal Prediction Market:** Augur, a decentralized prediction market platform based in the United States, employs smart

contracts to allow users to create and bet on the outcomes of legal cases and events, fostering a community-driven approach to forecasting legal trends.

• **Financial services:** Kotak Mahindra Bank, HDFC Life, State Bank of India and ICICI Bank are evaluating, through pilot projects, using smart contracts for remittances, trade finances, and loan management.

Smart contract adoption in the world is still in its initial stages, with only a few pilot projects and experimental implementations.

Benefits of smart contracts in blockchain technology

Here are some key benefits of using smart contracts.

- It saves money by removing intermediaries.
- It reduces contract execution time.
- It is an automatic process and does not rely on any third party.
- The cost of money transfers is lowered by removing all the intermediaries.
- It offers a transparent environment.
- It maintains record of all tasks that cannot be modified.
- It protects data and transactions from fraud. It is impossible to change the data inside a blockchain and still maintain its integrity.
- Its decentralization characteristic prevents the system from falling apart, which is the case when a centralized system is down.
- Build resilient ecosystem that interconnects stakeholders, machines and processes, while ensuring immutable storage of data and seamless yet secure exchange.
- Bring cost efficiencies and improved operational productivity through digitization and single view of information exchange and authentic verification.
- One version of truth integrated across stakeholders for real-time updates leading to reduced reconciliation efforts and disputes.
- Near real-time visibility into partner performance metrics



Smart contract breach

Smart contracts, despite their benefits, are not exempt from contractual breaches, and it is critical to understand the possible risks associated with such breaches and their remedies.

• **Contractual breach:** A breach may occur when a piece of code does not function as intended, parties do not adhere to the contract terms, or a third party disrupts the execution of a contract.

• **Types of contractual breaches in smart contracts:** There are several types of breaches that can occur in smart contracts, including:

- Technical breaches, which occur when the code does not function as intended.
- Performance breaches arise when one party fails to fulfil its contractual responsibilities.

- Third-party breaches occur when third parties disrupt the execution of contracts.

• **Remedies for contractual breaches in smart contracts:** The remedies available for contractual breaches in smart contracts are similar to traditional contracts:

- Termination of a contract: The non-breaching party may choose to terminate the contract.
- Damages: The non-breaching party can claim damages for any losses incurred because of the breach.
- Restitution: The non-breaching party is entitled to recover the value of any benefits that they have conferred on the breaching party.

• **Limitations of remedies in smart contracts:** There are numerous limitations to the remedies available for smart contract breaches, as given below.

- Enforceability: Smart contracts are still relatively new, and their enforceability in many jurisdictions has not yet been established.
- Immutable nature: Once a smart contract has been executed, the code cannot be changed, and any remedies for breaches must be built into the code from the start.
- Limitations of smart contract language: The language used to code smart contracts is limited, and it may be difficult to anticipate and provide for all possible breaches and remedies.



DAO smart contract theft incident

"The DAO" was a German decentralized investment fund built on the Ethereum blockchain that allowed its members to vote on proposals for how to invest the funds. There was a vulnerability in The DAO's code, which was exploited by a member who was able to steal approximately \$50 million at that time from the DAO's funds.

The theft of these funds led to a heated debate within the Ethereum community about how to respond to the incident. Some members of the community advocated for a hard fork of the Ethereum blockchain to reverse the theft and restore the funds to their original owners.

This event demonstrated that smart

contracts, which are regarded as being more secure and transparent than traditional contracts, can still be vulnerable to attacks and exploitation. This incident also underscored the need for careful coding and security practices while developing and deploying smart contracts.

Drawbacks of smart contracts

Here are some key drawbacks of smart contracts.

- Updating the procedures of smart contracts is difficult as fixing any flaws in the code can be time-consuming and expensive.
- Implementation of smart contracts makes it challenging to ensure that the requirements are met as intended, judging from the DAO smart contract theft scenario stated above.
- Although smart contracts seek to remove the necessity of a third party, it is not feasible in reality. In near future, third parties take on innovative and complex roles. For instance,

programmers and developers will need lawyers to grasp the rules to generate code for smart contracts rather than requiring them to draft individual contracts. Smart contracts protect critical elements in a business system that depend on the input from multiple stakeholders.

- The technology is still relatively new, and hackers are continually coming up with new ways to undermine the goals of businesses who set the rules for these codes.
- Regardless of whether the actions taken by various parties are in line with their intentions and understanding,

smart contracts can speed up their execution. Yet, this power can increase the damage that can result when things go awry, especially if there is no way to curtail or reverse undesired behaviors. According to Gartner, this issue offers challenges in smart contract scalability and management which are still not fully addressed.

- Smart contracts can be complex to set up and administer. They are often designed in a manner that makes altering them difficult or impossible.

Top smart contract platforms

- **Ethereum** is a well-known worldwide blockchain platform and the first to offer smart contracts to the larger crypto community.
- **Corda** is a business-focused distributed ledger system used to keep track of transactions on a shared ledger.
- **Hyperledger** is a global corporate blockchain initiative that provides the framework, rules, standards, and tools

needed to build open source blockchain applications for usage in a variety of industries.

- **Azure Blockchain Workbench** allows businesses to deploy a blockchain ledger along with a set of relevant Azure services often used to build a blockchain-based applications.
- **Chainlink** is a decentralized blockchain oracle on the Ethereum network.

There are a few other platforms like iCertis, SAP, Ariba which are conventionally used by corporates as an enterprise contract management software and are focused on building tools or integrate with blockchain technology to extend these transactions throughout the contract lifecycle.

Smart contracts and their future

Smart contracts have the capability to radically transform the financial and legal industries by streamlining and automating services for which clients currently pay hefty fees. Lawyers' jobs may possibly transform over in the upcoming time

when smart contracts achieve abilities such as assessment of traditional legal contracts and adaptable smart contract templates. Moreover, smart contracts' capability to supervise behavior in addition to automating processes, as well as their

potential for audits and risk assessments, could be useful for contractual compliance. The ability to automate operations through IoT and edge computing devices is another benefit of smart contracts.

Conclusion

The use of technology will aid in the modernization of contract management systems and in the creation of a more collaborative and inclusive environment. Then, all parties involved will have better visibility into their deliverables. This will assist in minimizing unnecessary risks and preventing unforeseen complications, ultimately helping accelerate the procedure. Gartner predicts that organizations using smart contracts will

increase its overall data quality by 50%. This will also require a change in the mindset of the users/stakeholders involved and will need to adopt a more result-oriented outlook rather than maintaining a few metrics of paper/digital contracts. Everything points to contract management becoming smarter and faster, with improved transparency and fewer risks. Smart contracts are not going away. The blockchain technology has had its ups

and downs, and there is still considerable room for development and innovation; however, the growing usage of smart contracts emphasizes the transparency, accountability, and effectiveness that they were intended for. In our perspective, the immense potential of the technology should be sufficient to spark its large-scale adoption in the future.



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* For organizations on the digital transformation journey, agility is key in responding to a rapidly changing technology and business landscape. Now more than ever, it is crucial to deliver and exceed on organizational expectations with a robust digital mindset backed by innovation. Enabling businesses to sense, learn, respond, and evolve like a living organism, will be imperative for business excellence going forward. A comprehensive, yet modular suite of services is doing exactly that. Equipping **organizations with intuitive decision-making** automatically at scale, actionable insights based on real-time solutions, anytime/anywhere experience, and in-depth data visibility across functions leading to hyper-productivity, [Live Enterprise](#) is building connected organizations that are innovating collaboratively for the future.

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