Smart Contracts: A Primer for General Counsel

In this whitepaper series, we have been examining Blockchain, including its significance as part of the "4th Industrial Revolution" and considerations for corporate boards and general counsel. Here, we turn our attention to Smart Contracts, which do not actually require Blockchains for implementation. That said, the looming power of combining blockchain with smart legal contracts and cryptocurrency payments in business processes and relationships compels us to address digital contracting to provide suggestions and considerations to examine for corporate legal teams.

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SMART CONTRACT BASICS

The Chamber of Digital Commerce describes a smart contract as "a computer program, typically running on a blockchain, that facilitates, verifies or executes business processes triggered by events, on-chain and off-chain transactions or interactions with other smart contracts." They draw a distinction between smart contracts and smart legal contracts, defining the latter as, "a smart contract that articulates and is capable of self-executing, on a legally-enforceable basis, the terms of an agreement between two or more parties."

Let's make this simpler. Smart contracts can be implemented without blockchain by using computer code that acts on a series of if/then conditions. The legal ones are enforceable. Think of them as robotic contract execution. For example, airline ticket insurance can be contracted and enacted entirely through automated processes, including the agreement between the buyer and the seller of the

policy, and computer-based verification that the insured's flight was indeed cancelled, triggering automated payment according to the terms of the policy. As one member of the Blockchain + Legal Industry Group expressed it, "The contract is not 'smart,' its performance on the blockchain or using AI is what makes it so." And of course, that smart contracts are self-executing is why we care – the efficiencies yet to be redeemed are enormous.

Now let's make this a bit more complicated, because contributing to the power of smart contracts are the many variations and combinations that are available: contracts entirely in code, in code with separate natural language versions, split versions that feature natural language contracts with encoded performance and/or payment mechanisms, and more. Users of smart contracts will need to work out which versions are best suited to their environments.

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SOME BLOCKCHAIN FEATURES (AND ACRONYMS) THAT ARE PERTINENT IN SMART CONTRACTING

- **Immutability.** As the Chamber of Digital Commerce has pointed out, in the current state of blockchain, content placed on it is immutable. Accordingly, parties to smart contracts on blockchain would have to negotiate off-chain or encode a new smart contract to change the terms or outcome of an existing contract.

- **Transparency with Confidentiality.** A core function of blockchain is enablement of transparency. Actions occur on blockchains for all to see and verify, and yet sensitive information can be encrypted, thus providing data privacy.

- **Permissioned and Permissionless Blockchains.** Permission-based blockchains are private, controlled by one or a handful of companies; whereas "true" blockchains are permissionless – open networks available for anyone to interact and participate in consensus validation, fully decentralized across unknown parties.

- **Decentralized Autonomous Organizations (DAOs) and Decentralized Finance ("DeFi").** Created on the strength of blockchain to govern crypto assets (including non-fungible tokens, or NFTs), DAOs are required to operate DeFi applications, wherein users "self-custody" their assets in their wallets, where they are protected by private keys, thus eliminating the need for trusted intermediaries.

- **Consensus Protocols.** A blockchain consensus protocol enables all parties in a blockchain network (including DAOs) to come to a common agreement on the state and operations of the ledger. The protocol provides the mechanism for participants to analyze and agree on additions before they are incorporated into the blockchain.

- **Oracles.** External sources of truth for validation. A critical concept for smart contracting. In the example provided above, the oracle would be the website (an independent 3rd party) that documents that a specific flight was cancelled.

CONSIDERATIONS FOR CORPORATE LEGAL DEPARTMENTS

Readers of this white paper have likely noticed that the use of smart contracts is by no means common. Reasons for low adoption of this promising advancement in contracting include the following.

- Given that contracts as code are typically inaccessible to lawyers and the courts, there is (understandable) reluctance for in-house counsel to give up control.

- Significant technical limitations persist, including the challenges of making certain standards and affects objective because they are inherently nuanced terms of art with case law behind them. Similarly, AI-based translators can't easily capture the difference among conditions and obligations.

- Market conditions are not yet fully evolved, including the regulatory frameworks, as well as providers of services as oracles. Notably, liability is not settled about use of oracles; and a regulatory construct that ensures quality of information does not yet exist. In other words, conditions are not like currency exchanges, which benefit from tacit understanding.

- Efficient breach of contract on a blockchain, given its immutability, is not inherent – although it can be programmed in.

- Classic contracts are created by legal departments and consumed by business and legal frameworks. Converting them into smart contracts that can be plugged into current business practices requires

that one link them correctly and reliably into all the points in the process where the contract is used.

- Execution of contracts requires some input data and output actions which require additional digital entities to enable them. Hence the Oracles and robotic process automation engines are needed to enable smart contracts.

In short, the regulatory, legal, and business environment is not fully ripe, and use of smart contracts is not indicated for complex agreements, which are almost impossible to automate. One might say that smart contract use is in the chasm between use by innovators and early adoption in the Rogers Adoption Curve.
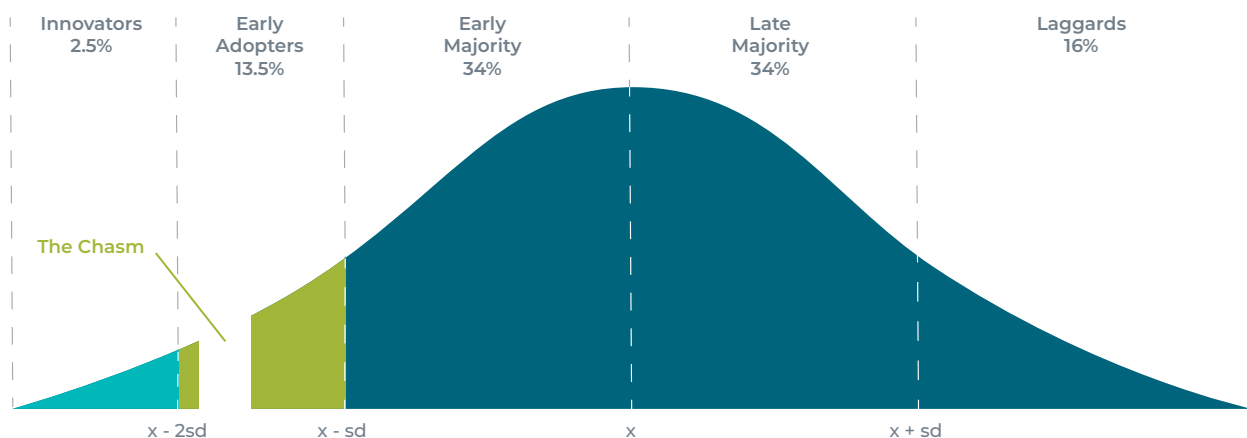
And yet, participation in the evolution of this methodology seems incumbent on legal departments, especially those with high volumes of simple transactions and/or serving enterprises that are moving forward in the use of blockchain and cryptocurrency.

Why? The advantages to be reaped are enormous. To recap, smart contracts on blockchains provide:

- Significant efficiencies through reduction in the use of human capital and intermediaries
- Data security and privacy through encryption
- Generation of high quality, accessible data that is continuously verified
- Reduction of mistrust through oracles

Rogers Adoption Curve

| Innovators 2.5% | Early Adopters 13.5% | Early Majority 34% | Late Majority 34% | Laggards 16% |

The Chasm

x - 2sd   x - sd   x   x + sd

Source: Everett M. Rogers, Diffusions of Innovation, 5th ed. (New York: Free Press, 2003), p. 281.

The most obvious use cases are in realms where blockchains are already in use, including financial services, supply chain, and healthcare.

LOGICAL USE CASES IN TODAY'S ENVIRONMENT

Smart contracts can accept required data from blockchains, such as product delivery or interest rates, to complete transactions. Thus, the most obvious use cases are in realms where blockchains are already in use, including financial services, supply chain, real estate and healthcare. Here are some quick examples:

- **Real Estate** - Mortgages enabled by smart contracts provide automated processing of payments and release of liens on property. Land title recording can be facilitated through smart contracts, increasing confidence in identity, and reducing fraud propensity.
- **Supply Chain** – Blockchains are utilized by Home Depot (among others) to verify inventory deliveries and reduce disputes (case study here). In scenarios that already exist, smart contracts add agreement terms and cryptocurrencies are used for payments in supply blockchain-enabled supply chain relationships.

- **Financial Services** – Three of Australia's largest banks and a large real estate and shopping owner have worked with IBM to create Lygon, a blockchain platform to digitize the bank guarantee process for both financial and performance guarantees (case study here). Again, digital contracts are natural allies in these relationships.

LEGAL & REGULATORY CONSIDERATIONS

- **Privacy.** Encryption notwithstanding, is it possible to comply with the right to be forgotten? [hint: it's possible to throw away the encryption key as an irreversible short-cut]
- **Regulation.** Across the globe, regulators are considering reforms to support utilization of blockchain, DAOs, smart contracts and crypto currencies, but progress is slow and joining with industry groups to gain consensus may aid advancement.
- **Cross-border.** Legality in the Common Law countries seems clear, but variations in Civil Code exist and changes in laws/regulations can affect existing contracts.
- **Validity.** Technically, smart contracts are unilateral. In the short term, trust is key. Longer-term, regulatory change is needed to smooth the path.
- **Location.** It is difficult to ascribe real-world locations (jurisdictions) to digital actions and objects; another issue that international law will have to overcome.
- **Stopability.** Smart contracts can become deadlocked. Encoding a "kill switch" may be a solution.
- **Mutability.** Long-standing contracts naturally change over time. A governance framework may be needed.
- **Litigation.** In a permissioned blockchain, data extraction can be accomplished through regulator or auditor representation in the consortium or a consensus protocol.

PREPARING FOR THE FUTURE BY EXPERIMENTING WITH SMART CONTRACTS

Forward-leaning in-house legal executives, especially those in corporations that are already using blockchains and/or cryptocurrencies, may wish to build smart contract muscle by conducting pilots in carefully controlled environments. Here are some suggestions for ways to experiment and gain useful lessons and experience:

- **Start simple.** Choose a low-risk type of agreement that could be scaled to deal with high volumes in favorable jurisdictions.
- **Ensure a strong business case.** Look for a demonstrated need best met through the unique technical capabilities of smart contracting on blockchain.
- **Partner and collaborate.** Leverage a trusted business relationship network. Engage with IT and other internal units, practicing cross-functional collaboration paradigms specific to smart contracts.
- **Put a conventional master agreement in place.** Smart contracts can be utilized for discrete transactions within that umbrella, much like today's scopes of work (SOWs).
- **Use flowcharts.** Gain clarity and comfort by breaking down the contractual relationship into if/then statements or decision trees.
- **Remember the hybrid options mentioned above.** Try smart clauses or payments rather than trying to fully automate an entire contract.
- **Build in flexibility.** Anticipate and provide mechanisms to adjust for changes in laws, regulations, and evolving practices.
- **Specify ownership of the generated data.** Shared ownership is an option.
- **Set clear metrics.** Spell out intended learning and ensure the targeted performance can be measured.
- **Set up checkpoints.** From the outset, specify conditions to update, roll back or terminate agreements.

It is important to note that investments in digital contract lifecycle management and contract analytics are already putting legal departments on a path toward enabling smart legal contracts.

RAMPING UP KNOWLEDGE AND CAPABILITY

Short of conducting smart contracting pilots, legal departments can prepare for the wave of the future by building internal subject matter expertise through opportunities to specialize in providing legal advice around the use of blockchain, as well as to undertake research and/or courses on blockchain and cryptocurrencies. Hiring lawyers who code or offering training in coding are additional near-term options.

It is important to note that investments in digital contract lifecycle management and contract analytics are already putting legal departments on a path toward enabling smart legal contracts. As contracts are digitized and the contractual terms, clauses and concepts become ever more structured and standardized with the assistance of AI-based technology, the contracts themselves are more susceptible to representation in code.

For many of the simpler obligations, it is possible to imagine that a human agent is not necessary to ensure the successful realization of a promised obligation.

A final note. While digitalization and standardization prepare the way for smart contracting in a blockchain-enabled business environment, in-house legal professionals should also consider how to calibrate risk to the potential rewards. Not very long ago, the use of eSignatures was impeded by concerns that in some jurisdictions and circumstances, they might not hold up. Those perceived risks were soon overwhelmed by the massive adoption of eSignatures because the benefits of enabling faster transaction velocity far outweighed the costs of disputes over signature validity. We may soon be at a similar juncture in the use of smart contracts, where the circumstances are not universally perfected, but the compelling benefits push us ahead, thereby developing the necessary regulatory and business conditions, and cultivating the underlying tacit understanding.

USING SMART CONTRACTS TO AUTOMATE TRANSACTIONS

A Smart contract is an active contract which can execute itself without requiring the intervention or supervision of a human agent.

A contract usually contains one or more obligations, a form of promised future activity when the requisite conditions are met. When the contract is agreed upon by the parties to the contract, it is tacitly understood that all the obligations explicitly or implicitly expressed in the contract would be realized in the future, in response to events that signal that the conditions for realization of the obligation have come to pass.

Conventionally these obligations, or promised activity, as well as the conditions they are contingent upon, are expressed in natural language (or "legalese") in a contract document. Human agents who are responsible for the contract execution, determine whether the conditions are appropriate and take the actions mandated in the contract.

For many of the simpler obligations, those that involve simple actions in response to unambiguous events, it is possible to imagine that a human agent is not necessary to ensure the successful realization of a promised obligation. In the digital world if the condition and consequent action can be translated to digital information signals, a modern computer running a program can be relied upon to ensure contract execution. Such a program is called a 'Smart Contract."

The scenario that follows illustrates this point.

ILLUSTRATION OF A FULLY AUTOMATED TRANSACTION ENABLED BY A SMART CONTRACT

When one purchases insurance to compensate for potential financial costs incurred due to travel delays, one expects that when the travel delay is unambiguously verified, the insurance company will pay the agreed upon amount of money to the nominee defined in the insurance policy document. This is usually activated via the traveler making a claim to the insurance company, usually via an online digital claim registration and a human being acting upon the data and making the obligatory payment. This transaction is, in principle, simple enough to be automated. The smart contract version of this works as follows:

A   When purchasing an airline ticket, a travel delay insurance is purchased which provides some payment to the buyer if the delay in travel is more than a duration stipulated in the contract, say six hours (very complex conditions can be put in the contract as well).

B   Since it is a smart contract, a smart clause to this effect is created, either by an AI engine reading the contract or from pre-defined program code (a smart clause) with parameters filled in when the contract is created.

C   The smart contract program is scheduled to execute on the day of the travel and monitors the arrival of the flight using the flight details via a trusted source like Flight Aware (https://www.flightaware.com), in this case, the "oracle."

D   After the arrival of the flight at the intended destination, the contractual conditions are verified by the program and if a delay of more than the stipulated time has taken place, an automatic payment is made in a safe and secure environment to the buyer via a digital mechanism.

E   The traces, or evidence, of all these activities are stored in a standard common data format in an immutable trusted store like a distributed ledger or blockchain.

The obligation to pay in the contract is thus converted to an executable fragment of code and initiated automatically and realized with the traces of the execution recorded in a legally verifiable way. This is the smart contract.

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