Centre for International
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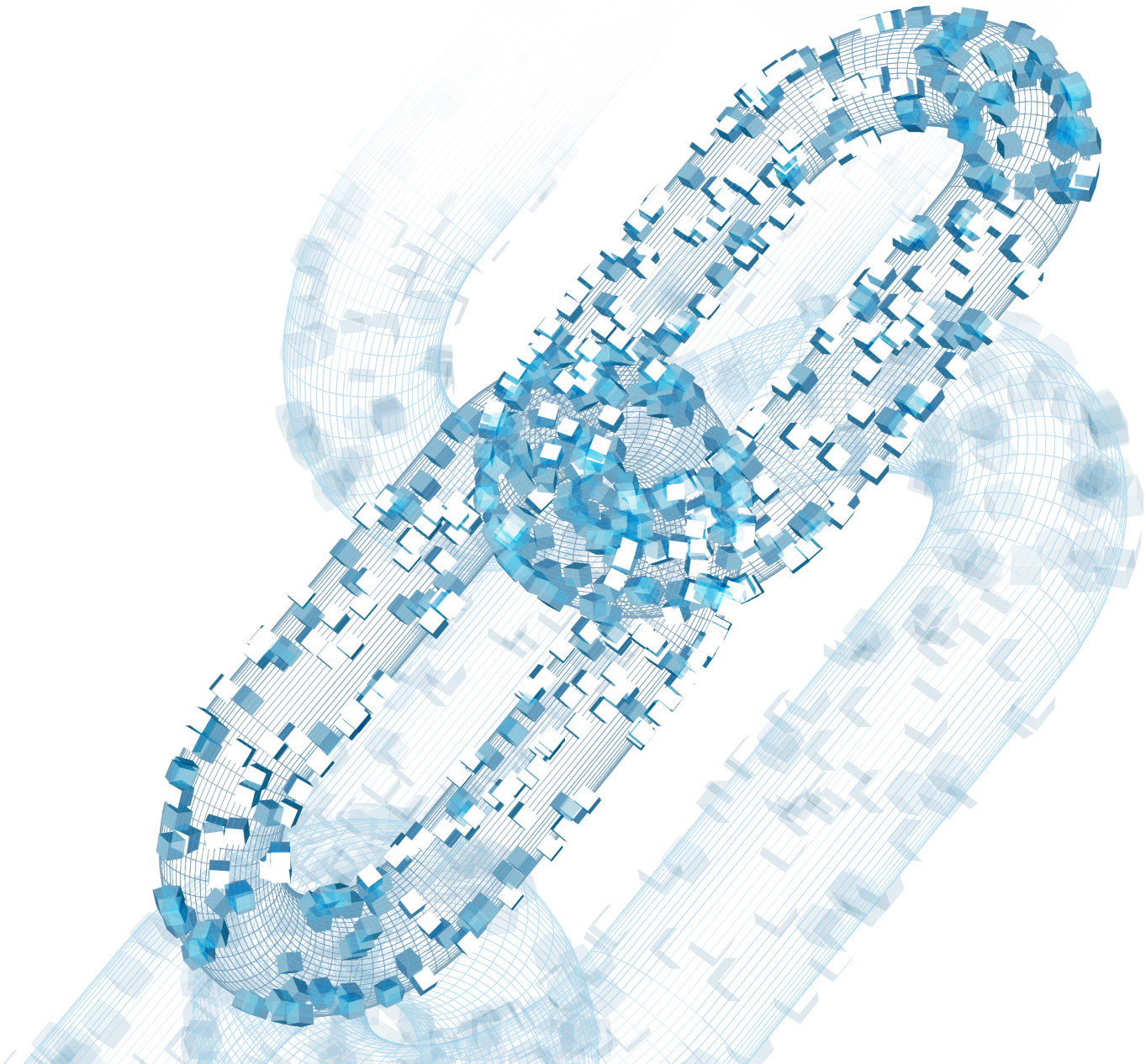
Enforcing Smart Legal Contracts
Prospects and Challenges

Marsha Simone Cadogan



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67 Erb Street West
Waterloo, ON, Canada N2L 6C2
www.cigionline.org

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About the Author

Marsha Simone Cadogan is a CIGI senior fellow specializing in intellectual property (IP), trade and technology law. Much of her work focuses on IP, innovation strategies and high technology in global economies.

She is a practising lawyer (Ontario Bar) and consultant with a Ph.D. in international IP.

She serves in leadership positions for various organizations regionally, nationally and internationally, including the high-technology sector (start-ups), Licensing Executives Society USA & Canada, International Association for the Protection of Intellectual Property, International Law Association-Canada and the Intellectual Property Institute of Canada.

Acronyms and Abbreviations

B2B	business-to-business
B2C	business-to-consumer
DLT	distributed ledger technology
ECDSA	Elliptic Curve Digital Signature Algorithm
IP	intellectual property
NFTs	non-fungible tokens
ONCA	Ontario Court of Appeal
SCC	Supreme Court of Canada
TOU	terms of use
UNCITRAL	United Nations Commission on International Trade Law

Executive Summary

Technological innovations are increasingly integral to most aspects of a business. The blockchain is a product of technological innovation and can facilitate business transactions that span different industries and sectors across economies. The automated nature of the blockchain means that most of its operation is performed without human involvement. Smart contracts are coded commands on the blockchain that allow specific activities or transactions to be performed. This paper examines the prospects and challenges of enforcing autonomous agreements executed on the blockchain and the role of blockchain online terms of use agreements (blockchain TOUs) in enforcing these automated agreements. The analysis is specific to common law jurisdictions, namely in Canada, and deals with legally binding relationships in particular. The paper examines the contractual formation of autonomous agreements facilitated by the blockchain and the peculiar but crucial relationship between these agreements and blockchain TOUs. The users' acceptance of blockchain TOUs is required as a condition for using the blockchain platform. Whether a blockchain online TOU is contractually binding is jurisdiction and case specific. Through case law analysis, the paper concludes that the limitations of smart contracts are less of a compromise to blockchain transactions where *valid* blockchain TOUs are used, and where the matter is of consumer-to-business transactions.

Introduction

Smart contracts and the blockchain are products of advanced technological innovation. Smart contracts are self-executing and self-enforcing coded language in computer programs operated on the blockchain (Durovic and Janssen 2018). A blockchain is a technology that synchronizes cryptographically signed information and is distributed on a peer-to-peer basis across decentralized networks. These technologies contribute to revolutionary changes in how services are offered,[1] consumed[2] and conceptualized[3] in consumer markets. Smart contracts execute and confirm transactions[4] on the blockchain based on programmed commands in the system. The growing body of literature on smart contracts and blockchain indicates that these technologies can be or are already being used in different economic spheres and sectors.[5] The benefits of smart contracts and the blockchain are numerous. The technologies can reduce business-to-business (B2B) transaction costs, facilitate the automation of several business-to-consumer (B2C) transactions and are disrupting how traditional services are performed. The level of access, transparency and consensus on blockchain impacts how adequate a disintermediate it is (that is, whether the technology can effectively replace or complement services and processes). More importantly, the characteristics of a blockchain can influence the legal and governance significance of smart contracts to transactions (Mik 2019). Blockchain governance refers to the adequacy and effectiveness of measures and rules used to monitor and operate the network.

This paper critically assesses whether smart contracts can be enforced in jurisdictions with specific emphasis on the common law jurisdiction of Canada. Other common law jurisdictions, in particular the United States, are used to bring a comparative analysis into the paper's perspective on the likely prospects and challenges associated with enforcing smart contracts as legally binding agreements. This paper is concerned with legally binding smart contracts. The author refers to legally binding smart contracts as transactions

1 Blockchain notary services are an example of recent developments in the type of product offerings that blockchain can be applied to. See FinanceFeeds Editorial Team (2021).

2 Outside of blockchain's use as a digital currency, one of the mainstream applications of smart contracts and blockchain technology is in digital arts. Non-fungible tokens (NFTs) are unique digital assets stored on a blockchain that records and stores information. For insight into how blockchain and smart contracts can be used in different industries, see Trillmich, Goetz and Ewing (2020).

3 The metaverse is an example of how technology is being used to conceptualize and create new virtual experiences for consumers using virtual and augmented reality. Blockchain and the metaverse are different technological frameworks. However, there are aspects of the metaverse that use smart contract blockchain applications. See, for example, Jones (2022); Verna (2022).

4 "Transaction" is used in this paper to refer to any change on the blockchain, including payment activities and the transfer of assets. See Gray (1981).

5 The literature is vast and includes Tsai (2022); Li et al. (2021); Sava and Dragos (2022).

on the blockchain performed by smart contract technology, which has legal consequences because it gives rise to relationships between parties that would be contractual under traditional contract law or addresses concerns that are contractual in scope based on the nature of the parties (Werbach and Cornell 2017; Durovic and Janssen 2019, 65–72).

The paper is divided into several parts. The first section discusses the technical capabilities of blockchain and smart contract technology. This section includes a definition of relevant terms and the functionalities of the blockchain. The paper then explains the difference between smart contracts and smart legal contracts. It examines how smart contracts can be classified as legally binding agreements (therefore, as smart legal contracts) and also discusses contract formation in these transactions. Specific aspects of enforcing legal contracts in common law jurisdictions are then addressed in the paper. Given the technical limitations in smart contract technology, these sections of the paper assess whether blockchain TOU agreements can legally bind parties involved in smart legal contract disputes. To this end, the author examines judicial approaches to *online* TOU agreements in Canada and the United States and assesses whether blockchain TOU agreements are likely to be considered legally binding agreements, and the limitations in this area. The final parts of the paper are concerned with two issues: first, what type of relationship may courts infer between smart legal contracts and blockchain TOU agreements in the context of enforcing blockchain transactions, and, second, what implications do legal developments in the interpretation of arbitration clauses in online TOU agreements have on the validity of smart legal contracts? These issues have significant implications for the future of smart legal contracts as integral components of blockchain technology.

Blockchain and Distributed Ledger Technology: Definition and Scope

A blockchain is a form of distributed ledger technology (DLT) (Szabo 1996). A DLT stores and distributes records of transactions about assets (ISDA and Linklaters 2017).[6] The literature review about blockchain describes it as a technology that records and stores transactions[7] on a ledger. It distributes these transactional records to all computers connected to its system. The information entered on the blockchain is time-stamped and verified through the technology's interaction with the data. The time-stamp identifies and specifies a time when a particular transaction on the blockchain took place. By time-stamping data, the blockchain technology "includes the previous timestamp in its hash, forming a chain, with each additional timestamp reinforcing the ones before it" (Nakamoto 2009, 2).

Blockchain nodes[8] are decentralized. In other words, information recorded and stored on a blockchain is not controlled by a central authority. This is the objective of the blockchain: to create a decentralized system where people can transact with each other without the need for a central authority to validate or control transactions.[9] Anyone can also access this information. However, as the author explains later, the amount of information accessible to the public depends on the nature of the blockchain. Although consensus is needed to validate a transaction, not all blockchain nodes need to agree. However, there must be a *majority consensus* among blockchain nodes for a transaction to be validated.

6 Ibid.

7 Durovic and Janssen (2018); DiMatteo, Cannarsa and Poncibò (2019); Cong and He (2019); US, HB 2417, *Signatures; electronic transactions; blockchain technology*, 53rd Legislature, Reg Sess, Ariz, online: *Arizona Legislature* <www.azleg.gov/legtext/53leg/1r/bills/hb2417p.pdf> (Arizona's amendment to the Arizona Electronic Transactions Act to include provisions on blockchain and smart contracts).

8 Refer to Table A2 in the Appendix for an example of how nodes operate.

9 Ibid.

Blockchain Roles

Blockchain technology's design, functionality and operation are its architecture. Based on the architecture of the blockchain, the technology can store, record and time-stamp infinite types of transactions. These transactions and information are immutable because the inputs on the blockchain cannot be reversed. Although bitcoin[10] is the most well-known type of cryptocurrency, blockchain's architecture makes it possible for both electronic payments and non-financial transactions to be performed using the technology. This architecture allows contracts to be formed.[11] Cryptocurrencies are digital currencies that verify, record and store payment information about transactions. They allow payment transactions to be performed on the blockchain. Bitcoin is the first digital currency developed to enable payment transactions between parties who do not know each other, without needing a trusted third party (Nakamoto 2009). As use cases of the blockchain show, the technology can be used to replace or complement several existing services and processes. Bitcoin's native scripting language is restricted to allowing the use and transfer of bitcoins between parties or accounts. While bitcoin facilitates financial payments on blockchain, the Ethereum system extends blockchain uses to non-payment and "hybrid-financial" situations. Ethereum operates on computer codes that self-execute and self-enforce commands, confirmations and actions based on triggers programmed in its system. The computer program that creates Ethereum is called Solidity.[12] This program makes and executes commands based on the codes used to create it or with which it interacts. A wide variety of B2C and B2B transactions that give rise to contractual relationships can be performed using the Ethereum system. Table 1 shows the different types of transactions that bitcoin versus Ethereum can facilitate. How contractual obligations or legal relationships are produced in these settings, and how they are likely to be dealt with in Canadian common law jurisdictions, are discussed in the next section of the paper.

10 A bitcoin is a decentralized electronic currency that operates on a peer-to-peer distributed basis on the blockchain.

11 Contract formation is covered in detail later in the paper.

12 For how Solidity works, see https://docs.soliditylang.org/en/v0.8.17/index.html#.

Smart Contracts as Legal Agreements

Agreements are legally binding between parties if they fulfill the formation requirements of a valid contract (Swan, Adamski and Na 2018).[13] Contract formation requirements can differ between common law and civil law jurisdictions. In common law jurisdictions such as Canada (excluding Quebec), a contract is formed when an offer is accepted, the intention to create a legal relationship exists between the parties and *consideration* is given (ibid., chapters 4 and 5).[14] These elements are essential to developing contracts in common law jurisdictions. In making an offer, the offeror expresses and discloses to the other party the terms on which they are willing to engage in contractual relations with the other party. The acceptance of the offer by the other party conveys to the offeror that the party accepts the offer based on the terms expressed or reasonably understood by the party. This acceptance must be unequivocal and communicated to the offeror.[15] It is also essential that the parties intend for legal obligations to be created by their agreement. This difference is critical as otherwise contractual obligations would be placed on parties who make agreements with each other but have no intention for legal obligations to apply.

Consideration is a fundamental principle in the formation of contracts (ibid., chapter 2, sections 2.21–2.24). This principle is focused on the bargain made between the parties of the agreement and requires that something be given by one party in exchange for the act that the other party will do as an obligation under the contract (Adamski and Swan 2021, chapter 2). Consideration is the benefit the promisor receives under the agreement and the detriment suffered by the other party in reliance on the promise. The benefit may relate to a right, interest or funds to be received and the detriment of a promise to act or forbear from acting. While consideration should be sufficient, it need not be adequate. Therefore, its value or quantity is irrelevant: "a peppercorn

13 *Apotex Inc v Allergan Inc*, 2016 FCA 155 [Apotex].

14 *Apotex*, *supra* note 13; *Shepherd v Lundin Gold Inc*, 2020 BCSC 258.

15 *Scanlon v Standish*, [2002] OJ No 194.

Table 1: Differences between the Capabilities of Bitcoin and Ethereum in Blockchain Technology

Bitcoin and Other Cryptocurrencies	Ethereum
Money transfers and remittances	Money transfers and remittances (using Ether, Ethereum's digital currency)
Payment for digital services	Payment for digital services (using Ether)
	→ Authenticate the provenance of consumer goods and raw materials, including: – foods (using blockchain to trace and verify food safety and origin in global food supply chains[16]); and – minerals (using blockchain in the responsible sourcing of minerals from the Democratic Republic of the Congo) (Tucker 2021).
	→ Manage administrative services and facilitate the transfer of assets, including: – notary services[17] (notarizing and creating a digital hash of any digital content [Niemann 2022]); – licensing and collection of royalties for agencies in the creative industries, such as collective management organizations (Kapsoulis et al. 2020); and – paying health insurance benefits to clients.
	Record, time-stamp and produce unique digital assets: NFTs. An NFT is a digital asset with unique identification data that distinguishes it from another. NFTs are primarily associated with the creative economy, which creates and monetizes content such as art, film, sports and music. The most expensive NFT was sold for more than US$91 million in December 2021 (Block 2021). Because no two NFTs are alike, they cannot be traded for another. By contrast, cryptocurrencies can be exchanged for another (for example, bitcoins can be swapped for Ether and vice versa).
	Integrate with other innovative technological applications: the use of Ethereum in metaverse systems. The metaverse is an online environment where virtual and augmented reality is used to create real-life interactions and experiences for its users. Ethereum can be used in the metaverse to create NFTs and make purchases (using Ether).

Sources: www.kaspersky.com/resource-center/definitions/what-is-cryptocurrency; www.ibm.com/blockchain/solutions/food-trust; www.blocknotary.com; Kapsoulis et al. (2021). Table's analysis developed by the author.

16 See www.ibm.com/blockchain/solutions/food-trust.

17 See Blocknotary, a blockchain system that is dedicated to notary services (www.blocknotary.com).

will do."[18] A contract's validity may be challenged on the grounds of a party's capacity to enter into a contract[19] or the illegality of the contract.[20] When successfully challenged, the agreement becomes void and is deemed unenforceable from the moment it was created. This is summarized in Table 2.

The technical characteristics of smart contracts may lead one to reason that they cannot produce a legally binding relationship between parties.[21] Smart contracts that satisfy the requirements of contract formation may be legally binding between the parties based on the nature of the obligation created by the transaction or the predetermined arrangements the code executes (Sokolov 2018; Durovic and Janssen 2019, 66–77).[22] For instance, using the blockchain supply chain specification provided in Table 1,[23] *X* agrees to provide real-time inventory updates across *Y*'s supply chain and to pay its vendors using blockchain supply chain technology. Ether, the cryptocurrency, is used to pay *X* and *Y*'s vendors. *Y* has a legitimate expectation that *X*'s data will be in real-time, reflect all changes to its logistics and that payments will be made. *X* must provide the service as agreed. These expectations and responses between the parties are represented as autonomous codes and executed as smart contracts on the blockchain.

Nick Szabo used the term "smart contract" to explain the capabilities of the technology to automate processes based on computer commands. He defined a smart contract as "a set of promises, specified in digital form, including protocols within which the parties perform on these promises" (Szabo 1996). There is no universal definition of the term smart contract (Perugini and Dal Checco 2016; de Caria 2019). It is primarily defined in the literature by what the technology can do: execute software codes on the blockchain based on prearranged commands. The word "smart" refers to the technology's ability to perform self-executing and self-enforcing actions on the blockchain (DiMatteo, Cannarsa and Poncibò 2019, 4). Although humans are involved in developing smart contracts, there is no human involvement in their execution. It is an autonomous, immutable system on the blockchain; once the terms have been inputted as software codes, the codes are self-executing and cannot be changed retroactively.

The elements of contract formation exist in some smart contracts; when they do and are recognized under the agreement's jurisdiction, they may be enforceable. The author of this paper therefore refers to these types of smart contracts as smart legal contracts because of the commercial scope of the transactions, the nature of the relationship between parties and the private rights of the parties. A contractual agreement will not always result from the use of smart contracts.[24] For example, if a smart contract on a blockchain node[25] was tasked with configuring the settings of the internal computer system, this technical task would not create a legal relationship. This scenario is likely to be jurisdiction specific. Consider a blockchain that operates as a voluntary organization and is used by its members for the sole purpose of developing open-source applications. If there is no intention to create a legal relationship between the parties, it is unlikely that a smart contract will be legally binding in Canada.[26]

Natural language (that is, the language used by humans to interact with each other) is not used in smart contracts. Smart contracts use Boolean logic[27] to interact with other software codes on the blockchain. This presents interesting implications. It is unlikely that the software codes can fully

18 *Scheckter v Polonuk* (Alta CA), [1992] A No 974.

19 A person of an unsound mind or below the age of majority cannot enter into a contract. See, for example, Ontario's *Substitute Decisions Act*, 1992, SO 1992, c 30, s 2(1).

20 Table 2 summarily explains how an individual's mental capacity and illegal contracts can invalidate a contractual agreement.

21 A smart contract is also described as a pre-emptive self-help instrument where the parties have already decided on a course of action and use the technology to execute their agreement without any need for enforcement by the court. See Raskin (2017).

22 *Corner Brook (City) v Bailey,* [2021] SCJ 29.

23 See Table 1, second column, third row, first subpoint.

24 See Kevin Werbach and Nicholas Cornell (2017), who reason that smart contracts, although novel, cannot replace traditional contracts.

25 A blockchain node refers to the computer that is involved in computing the blockchain transaction.

26 See the Supreme Court of Canada's (SCC's) ruling in *Ethiopian Orthodox Tewahedo Church of Canada St. Mary Cathedral v Aga*, 2021 SCC 22 [*Ethiopian Orthodox*] (in which the court held a contractual relationship will not be implied between members of a voluntary organization where there was no intent by the members of the organization to conduct their affairs based on legal agreements); but see *Varjacic v Radoja*, 2021 ONSC 5822 (decided subsequent to *Ethiopian Orthodox*, in which the Ontario Superior Court of Justice ruled that a valid contract existed between the parties based on monies spent in the organization and the value of the properties they managed).

27 Boolean logic is an algebraic program used to determine what is true and false in program configurations.

Table 2: Factors that Impact a Contract's Validity

Factors	Explanation
Capacity to contract	Capacity to contract refers to either of the two factors that impede a contracting party's understanding of the nature and effect of a legal agreement: the age of the contracting party or their mental soundness. For example, a contracting party to a blockchain transaction specified in Table 1 may dispute the validity of a contract by claiming that they lacked the mental capacity to understand its legal effect when it was signed.
Illegality	A contract can be declared illegal because its performance violates a law and is therefore statutorily prohibited (Swan, Adamski and Na 2018, chapter 10), or it undermines the integrity of the legal system. Canadian courts will consider the purpose of the legislation to the performance of the contract and whether the contract is still valid despite the legislation.[28]

Source: Swan, Adamski and Na (2018).

translate the parties' contractual intentions. The other point is that since the coded language is irreversible, smart legal contracts do not allow flexibility to be built into how parties contract with each other (Eickstädt, Horsch and Seidel 2020; Ghodoosi 2021). While the software codes are programmed to perform specific actions if other coded conditions are met, it is unclear how smart legal contracts deal with unpredictable circumstances. For example, under a smart legal contract, *A* is to pay *B* ETH 20 to digitally certify certificates for *A*'s online course. *A*'s digital wallet will transfer ETH 20 to *B* if the coded script for "certify certificate" is used as a condition for payment. Subsequently, *A*'s course becomes accredited as a graduate certificate program. Will the smart legal contract certify the "accredited" certificates? This is unlikely if the software codes are programmed to an "if/then" transaction within a specific parameter (ETH 20 — digital certificate) that excludes this expression. Although this precision in coded commands removes ambiguity from contractual relationships, there is no room to give more than one interpretation of what the contract should be doing; it also makes smart legal contracts inflexible (Cannarsa 2020).

Regarding the legal literature on blockchain and smart contracts, four crucial points have been made that are relevant to how the author explains smart legal contracts and their limitations throughout this paper. First, coded language cannot replace a traditional contract or the regulatory system that enforces contracts (Verstraete 2019; Werbach and Cornell 2017; Ghodoosi 2021).[29] Second, smart contracts can be legally enforceable agreements if they satisfy contract formation requirements and are held to be valid. Here, the parties' intent to be bound by the agreement, and any situation affecting the contract's validity, are also relevant considerations. Third, and a corollary to the second point, notwithstanding the smart contract's ability to give rise to a legally binding agreement, there are transactions for which it is unsuitable. These include legal contracts with lengthy provisions and complex transactions where natural language is more effective in representing and interpreting the parties' intentions and when flexibility in renegotiating contractual terms is needed (Sklaroff (2017). Fourth, to be legally enforceable against a contracting party, smart contracts cannot stand alone and must operate within a more significant contractual agreement and legislative framework (Tai 2019). Significant, therefore, are the legal underpinnings of contract formation in smart legal contracts in common law jurisdictions (that is, what legal factors are likely to make smart legal contracts valid and binding between contracting parties, and what type of limitations is presented by the technology that may question the validity of these contracts). This analysis follows.

28 *Morrell (c.o.b. Bill's Carpentry & Painting) v Cserzy*, [2002] OJ No 698 (QL); *YouYi Group Holdings (Canada) Ltd et al v Brentwood Lanes Canada Ltd et al*, 2020 BCCA 130.

29 Farshad Ghodoosi argues that smart contracts shift the paradigm from traditional contract solidarity to digital solidarity and emphasizes that there are no digital substitutes for the human connection that comes from traditional contract mechanisms.

Contract Formation and Smart Legal Contracts

The formation of contractual relations in smart legal contracts has been compared to how contractual relationships arise in vending machine transactions (Szabo 1997; 1996; Rohr 2019). A vending machine's owner offers goods for sale in the automated machine. The purchaser selects an item from the vending machine and inserts payment (acceptance of the offer). The vending machine selects and dispenses the item to the purchaser. In this transaction, consideration is the payment the purchaser made in reliance that the vending machine will dispense the selected item. It may be argued that the physical act of the individual to insert funds into the vending machine and the availability of goods in the vending machine show an intention for the parties to enter a legal relationship with each other. Money is paid to receive a consumer item, and there is also an expectation that the item will not be dispensed without payment. The contract is executed once the coin or amount is inserted into the vending machine. There are differences between contract formation in vending machine transactions and smart legal contracts. One noticeable difference is that a human is involved in initiating the purchase by inserting money into the vending machine. Another is that the parties are known or can become known to each other. There is likely information about the vendor displayed on the vending machine, and the identity of the individual making the purchase can be ascertained. In smart legal contracts on a permissionless blockchain,[30] for example, the parties are not known to each other or are known by pseudonyms.

In Canada, as in several other common law jurisdictions, contracts can be formed with the aid of computer programs or entirely by computer programs. Ontario's Electronic Commerce Act, for instance, specifies that "a contract may be formed by the interaction of an electronic agent and an individual or by the interaction of electronic agents."[31] This means that the formation of smart legal contracts is not challengeable based solely on the fact that it executes and enforces an agreement without human involvement. This position is also explicitly taken by Arizona's (US) legislation on the validity or enforceability of a "smart contract." Suppose a blockchain transaction is disputed in Arizona. In that case, it may not be disputed because it was performed by a smart contract as these agreements "may not be denied legal effect, validity or enforceability solely because…it contains a smart contract term."[32]

Table 1 provides examples of the types of transactions that can be performed on Ethereum blockchains; this includes the creation and transfer of digital representation of physical assets.[33] The nature of transactions in smart legal contracts may be as follows. A joins an Ethereum blockchain and creates a contract by embedding coded language into the software program, which is then posted on the blockchain.[34] The embedded script allows smart contract (A) to transfer *X* (a digital representation of a famous violin) for ETH 50 before 11:55 a.m. ET on September 30, 2022, to another party who satisfies the offeror's requirement.

30 See Table A2 in the Appendix for a categorization of the different types of blockchains and the relationship between these characteristics and the nature of their operations. Permissioned blockchains impose restrictions on access and usage of their system. Permissionless blockchains do not have these restrictions and instead allow anyone to join and participate in the network.

31 *Electronic Commerce Act*, 2000, SO 2000, c 17, s 20.

32 *Arizona Revised Statue*, Title 44-7061 (A-C), 2017, signatures and records secured through blockchain technology; smart contracts; ownership of information; definitions, online: *Arizona Legislature* <www.azleg.gov/ars/44/07061.htm>.

33 Table 1, second column, fifth row.

34 Programming languages for smart contracts include Solidity, Vyper, Yul and Yul+. See https://ethereum.org/en/developers/docs/smart-contracts/languages/#solidity.

Elements of Contract Formation in Smart Legal Contracts

Offer and Acceptance in Smart Legal Contracts

This transaction can satisfy the contractual element of an "offer" as long as it precisely includes what is to be transferred (*X*, a famous violin), for how much (ETH 50) and when (before 11:55 a.m. on September 30, 2022) (Swan, Adamski and Na 2018, chapter 4, section 4.21). *B*, another party on the blockchain, accepts *A*'s offer with cryptographic keys by transferring ETH 50 before 11:55 a.m. on September 30, 2022. The process is an autonomous acceptance. This satisfies the legal definition of an "acceptance" under the common law if it is unequivocally communicated to the offeror (smart contract *A*) to indicate that the essential terms of *A*'s offer are known and agreed to by *B*.[35] Importantly, in *Apotex Inc. v Allergan*,[36] the Federal Court of Appeal (Canada) stated that "acceptance" is to be viewed objectively; the subjective intention of the parties is not to be considered. Acceptance then is assessed based on how closely the act of accepting the offer mirrors what the offer is asking for from an objective point of view: "the court is to view the specific facts of the case objectively in light of the practical circumstances of the case and ask whether the parties intended to be legally bound by what was already agreed to or, in other words, whether an 'honest, sensible business[person] when objectively considering the parties' conduct would reasonably conclude that the parties intended to be bound or not' by the agreed-to terms."[37]

The acceptance of the offer by *B* is communicated to the offeror *A* through cryptographic keys. These keys allow transactions to be digitally signed and verified on the blockchain. Ethereum uses Elliptic Curve Digital Signature Algorithm (ECDSA)[38] to sign and confirm transactions. The ECDSA produces public-private keys. Each blockchain user's account is associated with a public-private key. The public key is known to all participants on the blockchain and verifies to each participant that they are part of the network. However, private keys are known only to their owner and can be used to accept or transfer digital assets. In the above example, smart contract *A*'s public key is accessible to every participant on the blockchain. The private keys associated with smart contract *A* will be used to accept ETH 50 from *B*. Similarly, *B*'s private key is used to withdraw ETH 50 from *B*'s wallet and send it to *A*. Acceptance of the offer is made by digital signature with cryptographic keys. This likely fits the requirements of communication of an offer by acceptance under the common law. Many countries, including Canada and the United States, have enacted statutes recognizing the validity of digitally signed agreements. The Electronic Payments Regulation, a Canadian federal law, defines a digital signature as "the result of the transformation of a message by means of a cryptosystem using keys such that a person who has the initial message can determine (a) whether the transformation was created using the key that corresponds to the signer's key; and (b) whether the message has been altered since the transformation was made."[39]

Further, each Canadian province has enacted legislation that allows digital signatures to be used in electronic commerce. For example, Ontario's Electronic Commerce Act specifies that a digital signature is "electronic information that a person creates or adopts in order to sign a document and that is in, attached to or associated with the document."[40] Ontario courts have given a liberal interpretation to what constitutes a digital signature in a commercial arrangement. In *1475182 Ontario Inc. o/a Edges Contracting v Ghotbi et al.*,[41] the Superior Court of Justice held that although the defendant did not sign his text messages, the text messages to the plaintiff stated that he acknowledged the outstanding debt, classified as a digital signature. The defendant had communicated with the plaintiff on several occasions. These messages were "unique identifiers" of the defendant, which made his identity known

35 See *G Percy Trentham Ltd v Archital Luxfer Ltd* (1992), [1993] 1 Lloyd's Rep 25 at paras 50, 86 (CA); *Apotex Inc v Allergan Inc*, 2016 FCA 155 (QL) [*Apotex v Allergan*].

36 Ibid.

37 *Apotex v Allergan*, *supra* note 35 at para 32 (QL).

38 A digital signature authenticates the identity of each blockchain user by associating each user's account with public and private keys.

39 *Electronic Payments Regulations*, SOR/98-129, 1(a), (b).

40 *Electronic Commerce Act*, *supra* note 31, c 17, s 1(1).

41 2021 ONSC 3477 at paras 42–50 (QL).

to the plaintiff, and his response was accepted as an agreement that he owed the debt.[42]

The Intention to Create Legal Relations in Smart Legal Contracts

In common law jurisdictions such as Canada, the parties' objective intention in the agreement is instrumental in assessing whether the parties intended to create a legally binding relationship (Swan, Adamski and Na 2018, chapter 2).[43] In this context, the relationship between the parties and the interests at stake are helpful indicators. Therefore, for example, familial or friendly arrangements to do household chores in exchange for the use of the family car are likely to be treated as an informal agreement where the intention to create a contract is missing. The choice to create legal relations is an objective test that considers whether there is a "meeting of the minds" by the parties to be legally bound, having regard to the essential subject matter of the agreement. This is assessed based on the outward appearance of the party's conduct and not by their subjective intentions.[44] There is also authority in Canadian case law for a cautious approach when assessing whether an intention to create legal relations exists.[45] If there is no clear evidence to establish this intention based either on the factual background of the situation or as evidenced by conduct or writing, the court may not give effect to the agreement.[46] In the smart legal contract example above, it would be apparent to a reasonable person judging objectively that *A* and *B* intended to create a legal relationship. The digital value of the asset to be transferred and the time limit imposed on the purchase indicate that the nature of the relationship is commercial and consequential between the parties if conditions are not met.

The "Consideration" in Smart Legal Contracts

The element of consideration is also met in the example by paying ETH 50 in exchange for the famous violin. The courts in common law jurisdictions will not focus on whether the consideration is commensurate with what is to be received under the agreement but on whether consideration exists (something of value is exchanged between the parties).[47] This means that if the consideration in the smart legal contract is as minute in substance or value as a peppercorn,[48] it would still be legally acceptable as long as it represents what was understood and agreed to by each party. The nature of smart legal contracts means that the consideration is embedded as a coded script in the technology. Smart legal contracts have been classified as unilateral contracts. In a unilateral contract, one party makes a promise (the offer), and the other party accepts the offer by performing the contract: if someone's lost item *J* is found, they will pay *Y*. The offer is open to any party who can fulfill the offer, not by promising to find *J* but by finding *J*. Similarly, with regard to the smart legal contract example above, *A* will give the digital violin to any participant on the blockchain that pays by Ether before the offer ends. *B* responds by performing the act — transferring the Ether to *A* completes the contract. The consideration then is in the act's performance; the other party has not made a counter promise to the offeror.[49] The author will discuss challenges that can arise when enforcing smart legal contracts as unilateral ones in the section titled "Enforcement of Unilateral Contracts: Judicial Treatment."

The Capacity to Contract May Invalidate a Smart Legal Contract (Element of Contract Formation)

The capacity to contract on the blockchain does not refer to the ability of the smart contract technology to enter into legal relations but the capacity of the person authorizing the transaction (for example, the

42 Ibid.

43 *Chao Yin Canada Group Inc v Xenova Property Development Ltd*, 2021 BCSC 1445; *Ethiopian Orthodox*, *supra* note 26.

44 *Lindsey v Heron* & Co (1921), 50 OLR 1; *Apotex v Allergan*, *supra* note 35.

45 *Toronto-Dominion Bank v Leigh Instruments Ltd*, 45 OR (3d) 417 (QL).

46 Ibid.

47 *Urban Communications Inc v BCNET Networking Society*, [2014] BCJ No 522; *Source Assoc v Valero Energy Corp*, 273 Fed Appx 425 (QL).

48 *Re Canadian Pacific Ltd* (1996), 30 OR (3d) 110; *Forbes v Forbes*, 2022 ONSC 545.

49 *Carlill v Carbolic Smoke Ball Co Ltd* [1892] 1 QB 296; see also *SaskEnergy Inc v ADAG Corporation Canada Ltd*, 2019 SKQB 263 at paras 42–50 (QL); *Sail Labrador Ltd v Navimar Corp* [1999] 1 SCR 265 (QL).

Table 3: The Elements of a Valid Smart Legal Contract

Elements of a Valid Contract	Smart Legal Contracts
Offer	x
Acceptance	x
Consideration	x
Intention to create legal relations	x
Capacity	X*

Source: Author.
Notes: x = the element that can exist in smart legal contracts; X* = it may not be easy to prove legal capacity, especially on public blockchains.

party who wants to transfer Ether or the famous violin) to be legally bound by the agreement created by the smart contract (Giancaspro 2017, 828). The capacity to contract relates to the power of one party to enter into a legal agreement with another party regarding the nature of the situation and the legal consequences that arise from the contractual relationship.[50] Mental incompetence, if proven, for example, may cause a party to a contract not to understand the nature and effect of the agreement.[51] If a party has the capacity to contract on the blockchain, and the other elements of a valid contract also exist, the contract will be valid.[52] The challenge with smart legal contracts where the capacity to contract is concerned is that there may be no way of ascertaining whether the parties to the agreement had the legal capacity to enter into the transaction. This information may not be known in public blockchains,[53] where parties can remain anonymous and contract with each other. It can be argued that in traditional contractual disputes about lack of capacity to contract, Canadian courts may consider the state of mind of the individual when the contract was undertaken; therefore, the same applies to blockchain smart legal contracts.[54] Whether the court finds that a party to a contract is legally incompetent to enter into a valid contract is case specific and may vary by jurisdiction.[55] This legal reasoning will likely apply in lack of capacity disputes about smart legal agreements. The smart legal contract is likely to be valid unless otherwise established that the individual could not understand the nature of the blockchain transaction.[56]

From the analysis in this section, the author has shown that smart legal contracts can satisfy the legal requirements for forming a valid contract. Table 3 summarizes how closely aligned these requirements are with traditional contracts.

The next section of the paper deals with challenges to the enforcement of smart legal contracts in common law jurisdictions with specific reference to Canada and the United States.

Enforcing Smart Legal Contracts: Challenges

What guidance from jurisprudence applies to smart legal contract disputes? It is understood that the technology autonomously executes and enforces transactions on the blockchain. However, aspects of the technology may fail to perform a transaction fully. These failures can include faulty blockchain systems, errors in software codes or events in the

50 *Bank of Nova Scotia v Kelly* (1973), 5 Nfld & PEIR 1; *Parker v Burridge Estate*, 2019 NSSC 171; *Van De Geer Estate v Penner*, 2006 SKCA 12 (QL) [*Van De Geer*].

51 But see *Van De Geer*, *supra* note 50.

52 The author recognizes that the contract can still be challenged on other grounds such as mistake, duress or excuses.

53 Table A2 in the Appendix provides information about the nature of public blockchains.

54 *Alavi v York University*, 2013 ONSC 3213; *Datta v Eze*, 2020 ONSC 1240.

55 *Lynch Estate v Lynch Estate*, 8 Alta LR (3d) 291; *McLeod Estate v Cole*, 2021 MBQB 24.

56 *Van De Geer*, *supra* note 50.

physical world that interfere with the ability of the smart legal contract to complete a transaction. For example, a smart legal contract may rely on oracles to process a transaction between parties. Although the blockchain can operate without the internet,[57] the technology can use the internet to obtain real-world data that is useful for processing a transaction. For instance, the management of a set of condominium units may choose to use a blockchain to control heating and cooling systems in its buildings by allowing smart contracts to base temperature accuracy on weather reports from the internet. This is called an "off-chain transaction." The oracle then allows the smart contract to communicate with the real world and base its output on events occurring in the physical environment.[58] In the above example, if the data received from the internet is corrupt or is processed inaccurately, the terms on which the smart legal contract operates may likewise be affected. Another example of how off-chain developments can impact the performance of a smart legal contract is if a physical shipment of goods (*X*) is to be delivered to *Y*, the payment is deducted from *Y*'s digital wallet. The smart legal contract shows the delivery of the physical good, but it has not been delivered to *Y*.

This section therefore considers how smart legal contract disputes are likely to be resolved in the context of enforcement. The role of blockchain TOU agreements (blockchain TOUs) in interpreting or giving effect to smart legal contracts is an integral part of this analysis. Blockchain TOUs refer to the terms and conditions by which users access and use services offered through blockchain websites. It is essential to consider the role of blockchain TOUs in the enforcement of smart legal contracts. Based on the coding limitations in smart legal contracts, it is likely sparse on the extent of the contractual relationship between the parties. In interpreting contracts, Canadian common law jurisdictions are likely to read the agreement as a whole and give words their ordinary and grammatical meaning in line with surrounding circumstances that are known to the parties when they entered the contract.[59] Of relevance, then, is whether blockchain TOUs are binding and enforceable agreements that courts can consider in enforcing smart legal contracts (Savelyev 2017).

Online TOU Agreements and the Law

Online TOU agreements can be classified as contracts of adhesion. Information about dispute resolution, the governing laws that apply to the agreement, intellectual property (IP) ownership and other matters concerning a user's interaction with a website may be expressed in online TOU agreements. The terms of these agreements are not negotiated between the parties. Instead, they are based on standard terms drafted and imposed by the party with the more substantial bargaining power in the transaction.[60] Most contracts of adhesion are consumer contracts. A common feature of these agreements is that they are offered on a take-it-or-leave-it basis, with the party's acquiescence of the contract taken as an acceptance of its terms. Contracts of adhesion are legally binding unless otherwise held to be unenforceable. As stated by the SCC, parties may still be able to practise legal autonomy, choice and responsibility when deciding to enter these agreements.[61] That is, the enforceability of contracts of adhesion is not determined solely by its nature; as a party can decide to contract elsewhere but having decided to enter the contract, the party has a responsibility to comply with its terms if they are fair.[62] This section examines how courts have dealt with online contracts of adhesion, in particular clickwrap, browsewrap and sign-in wrap agreements. This paper refers to these electronic agreements as online TOU agreements.

Federal and provincial laws in Canada give effect to the use of electronic means to communicate acceptance of an offer in an agreement. In electronic transactions, a party can legally express acceptance of an offer by clicking an icon or touching a computer screen containing the information.[63] The Electronic Signatures in Global and National Commerce Act in the United

57 The blockchain operates through a network of nodes, which are distributed computer systems that share the same information with each other.

58 On the relationship between smart contracts and oracles, see Tai (2019), s 5.2.3.

59 *Corner Brook (City) v Bailey*, 2021 SCC 29; *Sattva Capital Corp v Creston Moly Corp*, 2014 SCC 53.

60 *TELUS Communications Inc v Wellman*, 2019 SCC 19 [*TELUS v Wellman*]; *Douez v Facebook, Inc*, 2017 SCC 33.

61 *Uber Technologies Inc v Heller*, 2020 SCC 16 [*Uber Technologies*] at para 162.

62 See also *Century 21 Canada Ltd Partnership v Rogers Communications Inc*, 2011 BCSC 1196 [*Century 21 v Rogers*] at para 162 (QL).

63 *Electronic Commerce Act, supra* note 31, c 17, s 19(1)(b).

States similarly recognizes valid contracts signed or formed electronically.[64] While the legislation permits electronic transactions to be formed, whether an electronic document is an offer or is enforceable as a legal contract is a subject matter that the courts may have to interpret.[65]

In clickwrap agreements, the user must agree to a website's terms and conditions by clicking on an icon before using the website or software application.[66] They are binding and enforceable as contracts if the terms on which the user engages with the website are adequately expressed in the agreement and the user is allowed to view the TOU. Whether the user has read the TOU before assenting to its terms and conditions is immaterial to the formation of the contract.[67] In *Douez v Facebook* (*Douez*), the plaintiff sued Facebook under British Columbia's Privacy Act[68] over the use of her name and pictures in Facebook advertisements. At issue was the enforceability of the forum selection clause in Facebook's online agreement that required the dispute to be arbitrated in California under California law. The SCC first considered if the clickwrap agreement was a valid contract. The court held that the clickwrap agreement was enforceable as it was clearly stated, and the plaintiff had clicked her acceptance of Facebook's TOU.[69] The offer and acceptance of a contract then, the Supreme Court reasoned, as per legislation, did not preclude contracts from being formed electronically. The Facebook user was also aware of the TOU and had assented to these terms. On public policy grounds, however, the agreement's forum selection clause was unenforceable as it interfered with the quasi-constitutional rights of local citizens.[70]

Online TOU may also take the form of a browsewrap agreement. In these agreements, the TOU is accessed by clicking on a hyperlink that either leads to the webpage or a set of webpages that contain website use information and are to be read and agreed to by the user before purchase or use is made on the website (Swan, Adamski and Na 2018, chapter 9, section 9.2).[71] Compared to clickwrap agreements, browsewrap agreements are more difficult to enforce as legally binding absent a finding that the user had reasonable notice of the terms and conditions on which the contract is based. The rationale that courts have used in applying this approach is that website users cannot reasonably expect to be bound by terms and conditions that were not brought to their attention.[72] The legal rules that pertain to the formation of contracts in the physical world apply to electronic modes of contract formation. The requirement for the offer to state all the terms on which it is based, and that the acceptance constitutes assent to all the terms based on a "meeting of the minds" on what the contract entails, are still relevant to the formation of online agreements. The elements of contract formation are also salient considerations in clickwrap disputes. The difference between the two agreements where enforcement is concerned is that courts may choose to conduct a "fact-intensive inquiry"[73] to ascertain if a legally binding agreement exists between the parties, as it may be challenging to determine if the user was aware of the website's TOU.[74]

Sign-in wrap agreements are another online TOU agreement that courts are likely to scrutinize.[75] These agreements are a hybrid of click- and browsewrap agreements. The user is notified on the website's interface that they agree to be bound by its terms and conditions by registering or making a purchase on the website. Hyperlinks to these terms are provided in the notification. However, although the website user is alerted to read the TOU, there is no option on the interface to indicate that this has been done. Notice of the terms of service is envisaged as awareness and assent to its terms.[76]

64 *Electronic Signatures in Global and National Commerce Act*, 15 USC § 7001 (2000), c 96.

65 *Douez v Facebook, Inc, supra* note 60; *Century 21 v Rogers, supra* note 62; *Sha-Poppin Gourmet Popcorn LLC v JP Morgan Chase Bank*, 553 F Supp 3d 452.

66 *Rudder v Microsoft Corp*, (1999) 106 OTC 381.

67 *Douez v Facebook, Inc, supra* note 60.

68 *Privacy Act*, RSBC 1996, c 373, ss 1(1), 3(2), 4.

69 *Douez v Facebook, Inc, supra* note 60.

70 The court's treatment of arbitration clauses in smart legal contracts is discussed generally in the section titled "Enforceability of the Arbitration Clause in Online TOU Agreements."

71 *Van Tassell v United Mktg Grp, LLC*, 795 F Supp 2d 770; *Century 21 v Rogers, supra* note 62.

72 *Sgouros v TransUnion Corp*, 817 F (3d) 1029 (7th Cir 2016) (QL) [*Sgouros*].

73 *Sgouros, supra* note 72; *Melvin v Big Data Arts*, 2021 US Dist LEXIS 148708 (QL).

74 *Century 21 v Rogers, supra* note 62.

75 *Sellers v JustAnswer LLC*, 73 Cal App 5th 444; *Selden v Airbnb, Inc*, 4 F (4th) 148 (QL).

76 *Peter v DoorDash, Inc*, 445 F Supp (3d) 580 (QL).

Canadian jurisprudence indicates that in consumer transactions where parties are of unequal bargaining power, and the recognition of a contract would be contrary to public policy or the intention of the weaker party, the court may refuse to enforce provisions of the agreement or the agreement in its entirety (Moore 2021).[77] This was established in two SCC cases that dealt with the enforceability of forum selection and arbitration clauses (respectively) in online contracts of adhesion. *Douez*[78] is a legal precedent in which clauses in consumer online contracts that are against public policy to the extent that they impede the rights of consumers will not be enforced by the court in Canada. In a subsequent decision to *Douez*, the SCC held an arbitration clause in a clickwrap agreement to be unconscionable based on the significant differences in bargaining power between Uber Technologies, a large corporation (the employer), and its employee.[79] The inequality in bargaining power was evidenced in the unfair terms of the clickwrap agreement. The employee could not negotiate the employment contract's terms as a standard service agreement. Labour disputes were to be resolved by mediation and arbitration in a foreign country (the Netherlands) and on the payment of fees that represented most of the employee's annual income. The SCC ruled that the arbitration clause was illegal as it impeded access to justice and was unenforceable. Therefore, case law developments in Canada indicate that courts will likely not enforce online consumer TOU agreements where there is evidence that the unequal power relations between the parties produce an unfair result for the consumer.

Concerning challenges to the enforceability of online TOU agreements between commercial entities, the outcome may differ. In *Century 21 Canada Ltd Partnership v Rogers Communications Inc*,[80] the British Columbia court held that the defendant (Rogers) was a sophisticated party to the contract with similar TOU on its website that restricted non-rights holders' use of copyrighted content. Rogers had copied and shared photographs and other information from Century 21's website on its webpages. The defendant claimed that the TOU agreement was not a binding and enforceable contract and, therefore, could not be the basis of a copyright infringement claim against it. However, the defendant was aware of the website's TOU and acknowledged its reasonableness. The online TOU agreement was held as binding between the parties.

A comparison of US court cases with Canadian decisions on the enforceability of online TOU agreements shows a similar trajectory.[81] There may be differences across the US states in the scope of the contextual analysis to "reasonable notice" and whether the website user assented to the notice. Still, there is consensus that the online TOU agreement should be conspicuous and accessible to the user[82] and contain relevant information,[83] and the user must have given assent to these terms.[84] The nature of the dispute also impacts how the court interprets online TOU agreements. Although the enforceability of arbitration clauses in smart legal contracts and blockchain TOU agreements are discussed later in the paper, at this juncture, it can be noted that courts have given effect to the validity of online TOU agreements and stayed court proceedings, thereby allowing the disputes to proceed through arbitration. This outcome is likely to happen when the parties are commercial entities and the online TOU agreement is unambiguous and known to the party.

Are Blockchain TOUs Contracts?

The analysis above indicates that blockchain TOUs can be legally binding as electronic contracts. The answer is also jurisdiction specific, as laws differ internationally and between states. With regard to Canada and the United States, the criteria then will likely involve an assessment of whether TOUs are used on a blockchain's website, to what extent and how blockchain users are aware of its TOU, and whether the TOU provides sufficient information about the contractual relationships between the parties and is accepted by the blockchain user. Greater scrutiny is likely to be given to blockchain TOU agreements where the user had not expressly assented to be bound by the terms of the agreement or was not aware that it constituted a contract (browsewrap and sign-up wrap

77 *Douez v Facebook*, *supra* note 60; *Bergen v WestJet Airlines Ltd*, 2021 BCSC 12; *Douez v Facebook, Inc*, 2022 BCSC 914.

78 *Douez v Facebook*, *supra* note 60.

79 *Uber Technologies*, *supra* note 61.

80 *Century 21 v Rogers*, *supra* note 62 at paras 119–23.

81 *DHI Grp, Inc v Kent*, 2017 US Dist LEXIS 178481 (QL).

82 *Specht v Netscape Commc'ns Corp*, 306 F (3d) 17 (QL).

83 *Cordas v Uber Techs, Inc*, 228 F Supp (3d) 985 (QL).

84 *Kravets v Anthropologie, Inc*, 2022 US Dist LEXIS 100202 (QL).

agreements). The nature of the relationship between the parties (that is, commercial or consumer contracts) also influences whether a contractual relationship exists and is to be enforced.

This assessment is not without its challenges. Blockchain TOU agreements are not uniform across blockchain platforms; there are differences in wording and the amount of information expressed in the TOU. Some contain sparse information that may reasonably lead a court to question whether the blockchain user knew that a contractual relationship exists or that the user is bound by its provisions.[85] Therefore, whether these agreements are legal contracts is likely to involve a contextual assessment of the surrounding circumstances that gave rise to the agreement. The following section examines the relationship between blockchain TOU agreements and smart legal contracts to ascertain whether courts can base the enforcement of smart legal contractual relationships on blockchain TOU agreements.

Will Courts Find a Relationship between Blockchain TOU Agreements and Smart Legal Contracts?

On what legal grounds can common law courts use blockchain TOU agreements to interpret or enforce smart legal contracts? As discussed in the paper, smart legal contracts are not well suited to lengthy contractual arrangements or complex transactions as the parties' intentions may not be discernible. Furthermore, determining the legal responsibilities between the parties will be necessary when the smart legal contract fails to execute or partially executes a transaction. To address this question, this part of the paper is focused on two issues: how unilateral contracts are interpreted by courts, and to what extent a court is likely to enforce the arbitration clauses in online TOUs. Arbitration is the process of adjudicating disputes outside the court system by a neutral third party (or third parties). Except for some permissioned and most private blockchains, arbitration is the preferred process by which blockchain operators seek to resolve disputes.

An analysis of these issues answers the core question raised in this paper: to what extent will common law courts enforce smart legal contracts? If there is a relationship between the TOU agreement and the smart legal contract, then blockchain TOU agreements may be crucial to the enforceability of smart legal contracts. Blockchain TOU agreements may help interpret or enforce a smart legal contract if it explains the scope of the contractual relationship between the parties. This reasoning can be supported by case law. For instance, in assessing the enforceability of unilateral contracts, Canadian courts have considered whether the unilateral contract is a clause in a bilateral agreement closely connected[86] to the transaction between the parties. The contract is therefore interpreted based on the contractual obligations specified in the bilateral agreement.

Smart legal contracts are unilateral agreements executed on an "if/then" basis by which the act's performance is the acceptance of the contract. Options to purchase agreements and rewards for lost items are examples of unilateral contracts. The performance of unilateral contracts requires strict compliance: if *X* has an option to purchase property *Y* by a specific time on payment of the required deposit, unless there is another agreement related to the transaction that indicates otherwise, to fulfill the requirements of the contract, *X* must strictly comply with the conditions of the option. In contrast, the rule on strict contractual performance is relaxed in bilateral contracts.[87] In common law jurisdictions, a bilateral contract that is substantially performed will be enforced if this is the intent of the contracting parties.[88] The doctrine of substantial performance allows a party that has performed the substantial obligations owed to the other party to enforce the agreement.[89] This is not absolute. If the party intentionally refuses to perform all the obligations under the contract or their intentions are driven by illegal activities, the common law doctrine of substantial performance

85 See, for example, the blockchain platform Ertha's TOU (https://ertha.io/terms/).

86 *Sail Labrador Ltd v Challenge One (The)*, [1999] 1 SCR 265 (QL) [*Sail Labrador Ltd*].

87 *American Creek Resources Ltd v Teuton Resources Corp*, 2014 BCSC 636 (QL); *Jesan Real Estate Ltd v Doyle*, 2020 ONCA 714 (QL) [*Jesan v Doyle*].

88 *Jesan v Doyle*, *supra* note 87; *4363 Investments Ltd v 527599 BC Ltd*, 2013 BCSC 2279; *Sail Labrador Ltd*, *supra* note 86.

89 *Excel Autobody Ltd v Tsang & Sons Holdings Ltd*, 2015 BCSC 553; *Bernard v Las Americas Communications, Inc*, 84 F (3d) 103; *Wildwood Cabinets Ltd v Stelor Holdings Ltd*, 2015 NBQB 83. For an example of what constitutes substantial performance in construction contracts, see *Construction Act*, RSO 1990, c C.30, s 2(1).

will not apply.[90] However, if the omissions of the party or the defects under the contract are merely technical, not significantly deficient, or do not deviate from what the parties contemplated under the agreement, the contract is still enforceable.

To enforce unilateral contracts, courts have considered the relationship between the contracts and related agreements the parties have signed to determine whether these agreements help reveal their contractual intentions. This approach determines if the parties intended the contract to be performed precisely or fully as stipulated (hence strictly complied with), or if a substantial contract performance will suffice to enforce the agreement. Following this approach, if the agreements are closely associated, the court can treat the unilateral contract as a clause of the bilateral agreement related to the contract. This may mean that the obligations under the unilateral contract are still enforced as the same conditions were agreed to in the bilateral contract the party signed. An overview of three cases that explains how this has been approached in Canada and the United States follows.

Enforcement of Unilateral Contracts: Judicial Treatment

The SCC in *Sail*[91] gave guidance on whether the non-performance of a unilateral contract makes the contract unenforceable when a bilateral agreement is also associated with the disputed transaction. The case concerned whether an option to purchase a leased vessel was unenforceable based on late payment by the lessee and a failure to submit administrative records to the lessor. The lease agreement was a bilateral contract made between the parties. However, the option to purchase was a unilateral contract by which the owner of the charter vessel promised to sell the ship to the lessee at the end of the lease. The SCC noted that "whether a contract which contains an option clause establishes a single, bilateral contract or two separate contracts, one bilateral and the other unilateral, is a matter of construction. Courts must examine the text of the contract and the context surrounding it to determine the parties' intention."[92] The bilateral contract required lease payments to be made on time and the lessee's account to be available for inspection at the lessor's request. These were essential obligations under both the option agreement and the bilateral contract. The SCC analyzed the surrounding circumstances that led to the late lease payment and the non-submission of records to the lessor and found that the delays could be reasonably explained and had been resolved by the lessee shortly after they had occurred. Therefore, by treating the option to purchase as part of the bilateral lease agreement, the SCC held that the lessee substantially performed the contract and was enforceable.

Jesan[93] is a recent interpretation of the SCC's decision in *Sail*. The respondent entered a lease agreement for a residential premises from the appellant with an option to purchase the property at the end of the lease term. The respondent signed two agreements: a lease agreement (the bilateral contract) and an option-to-purchase agreement (a unilateral contract). The appellant refused to accept the respondent's option to purchase the premises and demanded a higher price for the property. Additional financing could not be secured before the agreement's expiration, following which the appellant sought to repossess the property. The Ontario Court of Appeal (ONCA) reasoned that although the option to purchase was a unilateral contract, its terms were closely related to the underlying lease agreement (the bilateral contract) and, therefore, should be assessed based on the intention of the parties in the lease agreement. The ONCA then looked at the lease agreement to determine if the parties intended its terms to be strictly complied with. When the contractual language is clear on how the contract will be performed, the court will interpret the parties' intention as stated in the agreement.[94] The ONCA found strict compliance on payments and financing was required, and since the respondent had breached these terms, the option to purchase was also unenforceable.

90 *Tanenbaum and Downsview Meadows Ltd v Wright-Winston Ltd*, [1965] 2 OR 1.

91 *Sail Labrador Ltd, supra* note 86.

92 Ibid. at para 144.

93 *Jesan v Doyle, supra* note 87.

94 *Sail Labrador Ltd, supra* note 86.

Regarding the validity of unilateral online contracts, *Roley v Google LLC*[95] provides an interesting clarification. The plaintiff in *Roley* sued Google for breach of contract after the company changed a free storage Google Drive promotion into a paid subscription service. The plaintiff had used Google Maps to upload photographs. Based on the success of the plaintiff's pictures on Google Maps, Google emailed the plaintiff a promotional offer of 1,000 megabytes (1 TB) of free storage. When he discovered that payment was due after two years, the plaintiff filed for breach of a unilateral contract. In finding that a unilateral contract was not formed between the parties, the court made the following remarks: "The operative question under California law, therefore, is simply 'whether the advertiser, in clear and positive terms, promised to render performance in exchange for something requested by the advertiser, and whether the recipient of the advertisement reasonably might have concluded that by acting in accordance with the request a contract would be formed.'"[96]

The court distinguished *Roley* from other California and US federal court cases that considered advertisements unilateral binding agreements. In the email received by the plaintiff in *Roley*, there was no "clear and positive" statement about an unlimited free offer. There was a specific expectation on the part of the plaintiff: 1 TB of Google storage for life. Google did not use these statements in its correspondence with the plaintiff, nor could they be implied.[97] In addition, the online TOUs and enrollment pages did not contain this information.

Enforceability of the Arbitration Clause in Online TOU Agreements

This part of the paper limits its focus to current developments in the enforcement of arbitration clauses in online TOUs in Canada. It does not engage in detail with international commercial arbitration[98] issues as that discussion is better suited for lengthier and more substantive analysis than this paper can provide. Arbitration is a form of alternative dispute resolution. Its proceedings are private and autonomous, and the settlement is binding between the parties.

Courts in Canada are more likely to intervene in arbitration disputes that involve consumer transactions.[99] The court will likely defer to the agreement made by commercial parties to choose arbitration as the process for resolving disputes.[100] At the outset, it is important to define two terms. An arbitration agreement is defined under Ontario's Arbitration Act as an "agreement by the parties to submit to arbitration all or certain disputes which have arisen or which may arise between them in respect of a defined legal relationship, whether contractual or not."[101] This definition allows a consumer who disputes the existence of a contractual relationship in an online TOU transaction to seek redress from the court[102] since the law also applies to legal relationships that are not contractual. An arbitration clause, according to the act, is an arbitration agreement. Recent case law developments in Canada have seen courts scrutinize the arbitration clauses in online TOUs and have invalidated agreements that are unfair to the weaker party in consumer transactions.

The SCC has held that arbitration clauses in consumer online TOUs, which require that parties

95 *Roley v Google LLC*, No 21-15677 (CaseText) [*Roley*].

96 Ibid. at para 8.

97 *Roley, supra* note 95 at paras 11–12.

98 International commercial arbitration refers to the laws and rules that govern how commercial arbitration is conducted internationally. Several countries' international commercial arbitration laws are based on Model Law provisions of the United Nations Commission on International Trade Law (UNCITRAL) Model Law of International Commercial Arbitration and the New York Convention. See *UNCITRAL Model Law on International Commercial Arbitration 1985 with amendments as adopted in 2006*, GA Res 40/72, UNCITRAL, 2006 [*UNCITRAL Model Law*], online: UNCITRAL <https://uncitral.un.org/sites/uncitral.un.org/files/media-documents/uncitral/en/19-09955_e_ebook.pdf>; *Convention on the Recognition and Enforcement of Foreign Arbitral Awards*, 10 June 1958, UNTS 330 (entered into force 7 June 1959) [*New York Convention*], online: *New York Convention* <www.newyorkconvention.org/english>. Each province's arbitration act is based on the UNICITRAL's Model Law provisions and the New York Convention. Note, however, that in Ontario and British Columbia, an arbitration agreement does not need to be in writing but can be concluded orally or by conduct.

99 *Douez v Facebook, supra* note 60.

100 *TELUS v Wellman*, supra note 60.

101 Ontario, *International Commercial Arbitration Act*, 2017, SO 2017, c 2, Sched 5, Option II, s 7(1) [*Arbitration Act*].

102 The Arbitration Act of each province specifies which level of court can hear an arbitration dispute. In Ontario, this is the Superior Court.

resolve disputes through arbitration and not through court proceedings, can be invalidated. In *Uber Technologies*,[103] for example, the clickwrap agreement's arbitration clause was unconscionable as it required the Uber employee to resolve disputes through arbitration in the Netherlands at a cost that was expensive to him. Jurisprudence indicates that consumer protection laws can override provincial arbitration acts. When this applies, the arbitration clause in consumer contracts will not be enforced.

The law governing the arbitration agreement may differ from the law that applies to the rest of the contract. The significance of this is that the law that applies to the other provisions in the online TOU will not always apply to the arbitration agreement. If the law that deals with the arbitration agreement is stated in the TOU, it may still be challenged by a party on the grounds of forum selection. Forum selection clauses in online TOUs refer to provisions in the agreement that specify in which place a dispute will be resolved and what law will apply to the conflict. In online TOU disputes, parties may challenge the validity of forum selection clauses because the forum is located outside their province or country, or the law that applies to the arbitration agreement is not favourable to their interest.[104] This was the case in *Uber Technologies* and *Douez v Facebook*. Canadian case law in this area indicates that if legislation does not express otherwise, the courts will use a two-stage test to determine the forum for the arbitration agreement. In the first stage of the test, the party who seeks to prevent the court from hearing the disputes and wants to proceed with arbitration must establish that the arbitration clause is valid, clear, enforceable and applies to the issue that the court is asked to address. In the second stage of the test, the party that seeks to rely on the court to resolve the dispute instead of an arbitral proceeding must demonstrate why the court should not enforce the forum clause.[105] When the forum selection clause pertains to consumer contracts, the courts will consider whether there is significant unequal bargaining power between the parties and focus on public policy reasons that may warrant the dispute to be heard in court and not by arbitration.

The SCC class action[106] case of *TELUS Communications* illustrates how differences in the nature of the transaction impact whether courts will intervene in arbitration disputes. The case does not involve an online TOU but a contract of adhesion. This decision illustrates the different approach the court applies when deciding the arbitrability of disputes that involve consumer transactions compared to those between commercial entities. The case involved consumer and commercial parties who initiated a class action lawsuit against TELUS over the company's business practices. TELUS sought to compel its commercial customers to proceed through arbitration according to the contractual agreement between the parties. The Consumer Protection Act,[107] the Class Proceedings Act and Ontario's Arbitration Act were all central to the court's decision. In its ruling, the SCC specified that Ontario's Consumer Protection Act[108] overrides any arbitration agreement provision requiring a consumer to resolve disputes by arbitration. The court, therefore, affirmed what was already stipulated in the legislation: an arbitration agreement is invalid if it requires consumers to resolve disputes through arbitration and not through court proceedings.

The distinction between the two types of customers led to two different outcomes in the same case. The commercial parties also sought to stay the arbitration and proceed with the class action through the court. Courts have limited ability to intervene in arbitration proceedings, especially those that involve commercial parties. It is recognized that the law will give effect to the arbitration agreement unless otherwise warranted.[109] Ontario's Arbitration Act,[110] for example, stipulates that courts may intervene in arbitration matters only under four conditions:

- to assist with the conduct of the arbitration;
- to ensure that arbitrations are conducted in accordance with arbitration agreements;

103 *Uber Technologies, supra* note 61.

104 *Douez v Facebook, supra* note 60; *Uber Technologies, supra* note 61.

105 *Z.I. Pompey Industrie v ECU-Line N.V.*, 2003 SCC 27 (QL) [*Pompey Industrie*].

106 In class action lawsuits, one plaintiff or a small number of plaintiffs sue the defendant on behalf of a large class of persons who are similarly affected by the party's actions or omissions.

107 *Consumer Protection Act*, 2002, SO 2002, c 30, Sched A.

108 Ibid., s 7(2).

109 *Haas v Gunasekaram*, 2016 ONCA 744.

110 *Arbitration Act, supra* note 101.

- to prevent unequal or unfair treatment of parties to arbitration agreements; and
- to enforce awards.

This indicates a narrow parameter for the court's intervention in commercial arbitration disputes absent where the legislation permits. The SCC in *TELUS* did not stay the proceedings for the commercial parties involved in the dispute; it proceeded through arbitration.

Therefore, case law in Canada and legislation indicate that Canadian courts have the jurisdiction to determine if the arbitration clauses in online TOUs are valid agreements and should be enforced. While consumer contracts are more scrutinized than commercial arrangements, the Arbitration Act provides an avenue through which claims against enforcing arbitration clauses can be made.

Prospects and Challenges: Enforcing Smart Legal Contracts in Canada

Four considerations are integral to the prospects and challenges of enforcing smart legal contracts in courts. First, the nature of the transaction and the blockchain[111] impact whether the court will have jurisdiction and the extent of court involvement there may be in disputes. For example, it will likely be difficult for the court to intervene in commercial disputes performed on a public permissionless blockchain if the parties remain unknown to each other. Second, using smart legal contracts to perform B2C or B2B transactions does not preclude these transactions from being challenged either in court or through arbitration proceedings. Therefore, the coded language of smart legal contracts does not prevent a legal relationship from being formed and does not prevent the Arbitration Act or other applicable legislation from being used to challenge the enforceability of the transaction. The paper discussed how a unilateral contract's complete or precise performance is not required to enforce the contract if the agreement is intimately associated with a bilateral agreement between the parties. If the court establishes that the smart legal contract is part of another contractual agreement made between the parties, the transaction may still be enforceable. This point then leads to the role of blockchain TOU agreements in the enforceability of smart legal contracts. Blockchain TOUs can be valid contracts that help to interpret or give validity to smart legal contracts. However, several of these agreements are currently vague, not easily understood and very sparse on the legal relationship between users and the blockchain. For example, a particular blockchain supply chain platform's TOU refers to three different countries that will have jurisdiction over disputes.[112] Other blockchain TOUs suggest that disputes will be handled in a bifurcated manner through different modes of legal proceedings. For example, IP misappropriation may be conducted through the court but only after mediation; otherwise, the blockchain user must submit to arbitration.

Another challenge is that several blockchains use the exact wording in their online TOUs, expressing no differences in user type, legal obligations and, importantly, the scope of service they provide. There is a relationship between smart legal contracts and blockchain TOU agreements: the smart legal contract is performed and executed on the blockchain. An online TOU agreement conveys information to users about the terms and conditions on which its services are made available. As explained in the paper, absent a finding of unfairness or illegal activities, online TOUs can be valid contracts if the website user notices and accepts its terms and uses the service, having been put on notice. The challenge, then, calls for an assessment of the relationship between transactions executed by the smart legal contract, the content of the blockchain TOU agreement, whether users are aware of and agree with the TOU agreement, and the jurisdiction involved. These are enforceability issues that the legal system may be called upon to adjudicate in forthcoming years.

From the paper's analysis, Canadian courts will have jurisdiction to scrutinize the arbitration clause in smart legal contracts and blockchain TOUs if the transactions are B2C oriented and impact Canadian interests. A valid arbitration agreement raises a strong presumption that the

111 A public permissionless blockchain allows any participant to join and participate in the network's operation. See Table A2 in the Appendix for its characteristics.

112 This information is on file with the author.

dispute must be dealt with through arbitration, not with the court. However, the recent SCC case laws on the validity of arbitration clauses in online consumer contracts indicate that public policy considerations will factor significantly into the enforceability of forum selection and choice of law clauses in blockchain B2C transactions.[113] Commercial transactions may fare differently when the parties have agreed to arbitration; courts have deferred to arbitration and will not adjudicate the proceeding even when they have the jurisdiction to do so.[114] However, to decide whether the proceeding should be resolved by arbitration, Canadian courts are likely to assess the clarity and validity of the blockchain TOU agreement, whether an arbitration clause was used in the smart legal contract and what type of notice was given to the commercial party to the transaction. According to case law, the commercial plaintiff must present strong public policy arguments to justify why the arbitration clause should be invalidated if it is otherwise held to be valid.[115]

This paper has not addressed the factors that impact the enforceability of smart legal contracts in international commercial arbitration[116] situations. The author recognizes that several issues will determine the enforceability, including ascertaining which law governs the smart legal contract, the seat of the arbitration, and the law that recognizes and enforces arbitration awards.[117]

These factors were not discussed in this paper based on the volume of analyses required to engage with this discourse fully and the limited space to do so. It would be insightful, for example, to examine how different jurisdictions decide which law applies to arbitration agreements in online contracts and the implications for smart legal contracts and blockchain TOU agreements. It is possible for the smart legal contract to be governed by the law of two countries or states, either based on what is coded in the contract or how a court interprets the intention of the parties in relation to where they do business or reside.

For instance, an online contract may state that it is governed by the laws of Israel and its dispute resolution clause state that the law of New York applies to the arbitration agreement. An arbitration clause can be as short as one sentence, which expresses that disputes are to be resolved by arbitration. The UNCITRAL Model Law[118] specifies that an arbitration agreement can take the form of an arbitration clause. Therefore, in countries that have modelled their arbitration statutes based on UNCITRAL's Model Law (such as Canada), where no separate arbitration agreement exists between the parties, the clause that expresses how arbitration or dispute resolution is to be determined becomes the arbitration agreement of the contract. However, the law that governs the rest of the contract can differ from the law that governs the arbitration agreement. When these are unclear from reading the arbitration agreement, a court may be asked to decide which jurisdiction's law applies to the arbitration agreement. Rules on choice of law issues differ across jurisdictions and impact the arbitral process and outcome. The neutrality of arbitrators in ad hoc arbitration proceedings where the blockchain owner is the only party that can provide a list of arbitrators to preside over the proceedings is also an examinable issue. The impacts on smart legal contract enforcement internationally are worth considering.

113 This analysis may also apply in US state courts, including with regard to the validity of online TOUs. See, for example, *Nicosia v Amazon Inc,* 834 F (3d) 220 (QL), where the US Court of Appeals for the 2nd Circuit held that the plaintiff had not received reasonable notice of Amazon's TOU in regard to the purchase of harmful diet supplements ("we do not hold that there was no objective manifestation of mutual assent here as a matter of law…we conclude simply that reasonable minds could disagree on the reasonableness of notice"); but see *Scott et al v RVshare LLC,* 2022 US Dist Lexis 50825 (QL), decided in the US District Court of Tennessee, where it was held that Scott was aware of and gave assent to mandatory arbitration by accepting RVshare's online TOU.

114 *TELUS v Wellman, supra* note 60.

115 *Pompey Industrie, supra* note 105.

116 *Ontario's International Commercial Arbitration Act,* 2017, SO 2017, c 2, sched 5: "An arbitration is international if (a) the parties to an arbitration agreement have, at the time of the conclusion of that agreement, their places of business in different States; or (b) one of the following places is situated outside the State in which the parties have their places of business: (i) the place of arbitration if determined in, or pursuant to, the arbitration agreement; (ii) any place where a substantial part of the obligations of the commercial relationship is to be performed or the place with which the subject-matter of the dispute is most closely connected; or (c) the parties have expressly agreed that the subject matter of the arbitration agreement relates to more than one country"; *UNCITRAL Model Law, supra* note 98, s 3.

117 See Born (2020, chapter 4); Qiu (2020).

118 *UNICTRAL Arbitration Act, supra* note 98.

Conclusion

This paper examined the prospects and challenges of enforcing smart legal contracts, particularly in Canadian common law jurisdictions. It specifically focused on identifying contract formation in these agreements and under what conditions courts will enforce these agreements. The paper has shown how blockchain TOUs can be legally binding agreements and that these online contracts can be closely connected with smart legal contracts executed on the blockchain. These can be instrumental in proving the validity of blockchain transactions or in the performance of legal obligations under a smart legal contract. The extent of a court's involvement in smart legal contract disputes will likely be jurisdiction specific and influenced by the language used in underlying agreements associated with the transaction. The enforcement of these agreements will likely depend on the transaction type, the parties' nature and the dispute's subject matter.

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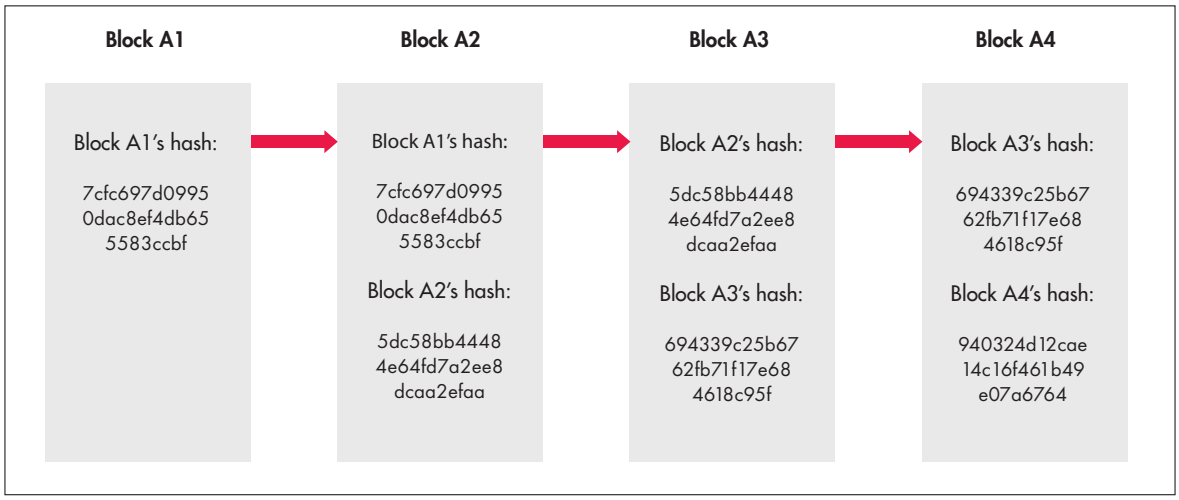
This paper benefitted from the comments of anonymous reviewers and Robert Fay, managing director of digital economy at the Centre for International Governance Innovation.

Appendix

Table A1: Formation of Blocks on Blockchain Based on Validation of Hash



Source: Hash generated from MD5 Hash Generator (www.md5hashgenerator.com/). Table's analysis developed by author.
Notes: This table shows how blocks are formed and validated on a blockchain. In the author's simplified example, a blockchain is used to source and pay a car manufacturer's global suppliers and to verify supplies. Block A1 contains information about the stocks sourced from suppliers during a particular month. A hash is used to represent this information. Block A2 includes supplier billing information for that month that can only be processed as bills payable by the car manufacturer if the hash of A1 is used. These activities are referred to as blockchain transactions. Block A3 processes these payments only if inventory details and supplier billing information from the preceding blocks align with the information it already has and needs to fulfill its task. In block A4, the manufacturer updates its financial records for that period, including any deductions due to damaged supplies. Although each block uses a unique combination of letters and numbers to represent a transaction, the transaction cannot be completed without including the preceding hash. A hash can be generated from the MD5 Hash Generator website (www.md5hashgenerator.com/).

Table A2: Blockchain Types

Public and permissionless	Public and permissioned	Private and permissioned	Private and permissionless	Consortium
The network is open. Any node can join the network, read its contents, write hashes and audit the activities.	Authorized nodes can participate in the network after their identity is verified.	Participants (nodes) must be approved or authorized by a company (the administrator) to join the network.	There are restrictions on who can access the network. Once approved, the user can participate in the network.	A group of organizations that share the consortium's common goals is invited to join and participate in the network.
Disclosure of identity is not required to join the network (pseudonyms can be used).	Disclosure of identity is required to join the network.	Participants' identities are known to each other.	Participants' identities are known to each other.	Participants' identities are known to each other.
The node can do consensus on the blockchain. Consensus involves validating transactions and adding blocks to the blockchain.	Any node in the network can validate transactions.	The administrator is the only party to write rules, make decisions or revert transactions on the system. The consensus, then, is centralized.	The participant's role is based on who can write rules, make system changes or participate in validating transactions. Functions are defined and restricted.	The group validates transactions and creates rules.
Blockchain contents are visible to everyone.	Blockchain contents are visible to participants.	Content visibility is defined and restricted by the administrator.	The administrator decides which content is visible and accessible to participants.	Activities are visible only to those who are part of the consortium.
For example, bitcoin and Ethereum (cryptocurrencies).	For example, Ripple,* a digital global payment system.	For example, central bank digital currencies.	For example, Holochain,** an open-source framework that supports participant autonomy over what they share and with whom they share it.	For example, the Global Business Shipping Network, consisting of major shipping lines and global terminal operators from the supply chain who collaborate on cargo release and trade finance.

Sources: Buterin (2015); Yermack (2017); Banerjee (2021); www.gsbn.trade/our-platform.

Notes: *Ripple is a cryptocurrency and blockchain solution provider (https://ripple.com/). **Some of the projects that are using Holochain's framework are featured on the blockchain's website (www.holochain.org/projects/). This table segments blockchain technology into four different types based on the level of accessibility and participation they permit and provides examples of each system. These segments are public, private and consortium blockchains. The table further specifies the key features of blockchain based on whether they are permissioned or permissionless. Permissioned blockchains impose restrictions on access and usage of their system. Permissionless blockchain does not have these restrictions. A public blockchain allows any participant to join and participate in the network's operation. This contrasts with private blockchains. In private blockchains, one organization controls access to and participation in the network. Private blockchain also places restrictions on the type of content accessible to participants. A consortium blockchain has features of both public and private blockchains. One of its key features is that a group of organizations with common goals makes decisions on what terms the network operates (Banerjee 2021).

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