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## Article Information

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# Smart contracts in Australia: just how clever are they?

**Lawyers in practice today live in a world of ongoing disruption. As automation, artificial intelligence and blockchain technology assists in reducing the costs of business transactions and increases the reliability of record keeping, the adoption of smart contracts is an opportunity for lawyers to help their clients improve efficiency and to reduce the scope for disputes, and a challenge for lawyers who do not stay abreast of this area.**

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**Snapshot**

- The adoption of smart contracts continues to grow, comprising a variety of contractual relationships, which are partly automated by computer software, and which run on blockchain technology.
- While smart contracts remove the human element usually involved in the performance of a contract, they are not 'smart' enough to completely avoid the need for lawyers, and have questionable validity under Australian law.
- The continued rise of automated legal processes, blockchain technology and smart contracts creates significant risks for lawyers who don't stay up to date and technologically literate.

Lawyers in practice today live in a world of ongoing disruption. As automation, artificial intelligence and blockchain technology assists in reducing the costs of business transactions and increases the reliability of record keeping, the adoption of smart contracts is an opportunity for lawyers to help their clients improve efficiency and to reduce the scope for disputes, and a challenge for lawyers who do not stay abreast of this area.

Blockchain based smart contracts have been increasingly deployed across the finance and property sectors in the last two years and even more widespread adoption is expected in the coming years as greater functionality and common standards emerge. Major banks, stock exchanges, and even postal services are investing in and investigating how blockchain technology can improve their cost base and business offerings (see, for example, J Grey, 'Australia Post's digital future rises from disruption as it embraces blockchain', *Australian Financial Review* (online), 10 November 2016).

Smart contracts pose important questions for contract lawyers and litigators as they require a multitude of issues to be addressed when contracts can self-execute based on complex computer code and without regard to the desires of the parties to the contract, or indeed the courts, once they are entered into.

**The blockchain**

Smart contracts currently rely on blockchain technology. A blockchain, at its most basic, is a mere database, but one running on a peer to peer network with no central authority controlling the contents of the database. More specifically a blockchain comprises a time-stamped block of text recording groups of transactions which are entered into by users using secure cryptographic keys. With each 'block' being linked to the preceding and following blocks, the complete ledger is a 'chain' of blocks where any unauthorised change to a prior block is rejected by the network. With the processing of the chain being managed on a decentralised peer-to-peer network of computers that opt-in to the network, it is almost impossible for a single bad actor to manipulate or alter the ledger of transactions already recorded in the chain.

The most well-known blockchain is that of Bitcoin, which continues to gain both publicity and value, having increased four-fold in value this year alone. An important limitation of the Bitcoin blockchain, however, is that it is nothing more and nothing less than a complete record of all transactions involving Bitcoin transfers (with some associated data). The Bitcoin blockchain cannot by itself run code or execute the soft-ware known as 'smart contracts'.

**Smart contracts**

Computer scientist Nick Szabo first posited the idea of smart contracts in 1994, as 'a computerized transaction protocol that executes the terms of a contract' (Don Tapscott and Alex Tapscott, *The Blockchain Revolution: How the Technology Behind Bitcoin is Changing Money, Business, and the World* (Brilliance Audio, 2016)).

It took almost 20 years for Mr Szabo's idea to become a reality, when the group that became the Ethereum Foundation launched what has become the Ethereum blockchain, upon which almost all smart contracts run. The Ethereum blockchain was designed to enable smart contracts with all the nodes (computers) forming the network, processing not only transactions of the currency token for the network (called Ether) in the same way as Bitcoin, but also processing the code of smart contracts as they execute. In short, the Ethereum blockchain acts as a global decentralised computer.

The nomenclature 'smart contracts' is used for various contractual relationships, such as:

1. an unwritten agreement, where inputs and outputs are extremely limited and trust is not required between the parties, for example, a vending machine;
2. a written agreement, eg terms of use for an online service such as Netflix where automated software responds to user inputs;
3. a written agreement incorporating the parties' reliance on a software driven outcome, where control over the execution of the software process is in the hands of a trusted third party, such as an escrow service;
4. a written agreement, usually in a human language, incorporating the parties' reliance on a software driven outcome where the software resides on a blockchain and executes without human intervention; and
5. an agreement, written only in machine readable computer code, executed entirely without human intervention once entered into, known as 'the code is the contract' or even presumptuously as 'smart contract law'.

The smart contracts currently gaining popularity fall into the fourth category and contain two key elements. First, they remove human involvement in part or all of the performance of the agreement, using automated code designed to execute without reference to the contracting parties' ex post intentions or desires. Second, they utilise decentralised blockchain technology to remove or reduce the need for a trusted third party or each party maintaining their own separate ledger of transactions, as well as to enable the automated execution of the code without potential interference from any party.

These smart contracts are now being used in Australia, with a recent well publicised example being an Australian 'AgTech' company, AgriDigital, running a pilot of the world's first ever wheat sale using a pilot blockchain ledger and smart contract code (James Eyers, 'Wheat farmers trial blockchain to sell grain and find it is fast and reliable', Australian Financial Review (online), 21 December 2016). The pilot involved a high degree of interlocking technology including the parties pre-agreeing to the price for the grain, automatic weighing of the grain delivery, verification of the funds via the blockchain and an automatic release of the funds to the farmer.

Recently, several major banks and Scentre Group announced they will be managing all Westfield lease bank guarantees using a blockchain solution, which will be one of the largest implementations of a blockchain in an Australian business and which in time is likely to extend to incorporate smart contract elements (Gina Baldassarre, 'ANZ and Westpac link up with IBM and Scentre Group for blockchain trial', *Startup Daily*, 10 July 2017). As such applications become widespread, there will be a fundamental shift in the kind of instructions and documents available to lawyers engaged to advise on the deployment of, or disputes arising in relation to, transactions involving smart contracts.

**Current legal issues for smart contracts in Australia**

A legally enforceable smart contract must still meet all the traditional elements of a binding contract. Any duress, undue influence or unconscionable dealings could render a smart contract void at law, despite being potentially unstoppable in the digital world.  Of particular concern are the most pure 'the code is the contract' smart contracts, lacking any notification of their terms as the terms exist only in machine readable code. The identity of the other party to the contract, or whether that party has capacity to enter into the contract, is usually unknown. Australian courts are yet to address a smart contract dispute.

**Potential liability of smart contract authors**

When a dispute arises under a smart contract, it may be difficult to determine where liability may fall. First, the identity of the authors of a smart contract, particularly in an open source context where multiple parties have modified the code, may

not be known or cannot be ascertained.

Second, the terms of use surrounding the automated parts of a smart contract are likely to be the subject of extensive written terms seeking to limit liability for the party proposing to use the smart contract in the first instance or to limit the choice of law clause to a jurisdiction most favourable to smart contract interpretation.

Third when the smart contract involves a new form of organisation called a 'Decentralised Autonomous Organisation' (**DAO**), there are further identity issues as the very nature of these new organisations is that those involved do not need to identify themselves. The relationship between these individuals within the DAO is also uncertain. While there has been no judicial consideration of just what a DAO is, it may be considered a partnership or joint venture.

Inevitably, the authors of a smart contract, usually developers and/or lawyers, will be potential targets for claims if a smart contract executes in an unexpected way or contains a bug which is exploited (see for example, Jessica Sier, 'The DAO hack: $US50 million lost', *Sydney Morning Herald* (online), 20 June 2016).

**Problems in enforcing smart contracts**

The decentralised nature of blockchain technology and cross-border operations means that any court order for injunctive relief will necessarily have to deal with re-adjusting the post execution position of the parties following the contract, which will require identifying the parties to whom any adjustments must be made, which itself can be highly problematic as noted above.

Further issues arise if it becomes known that a smart contract may or will behave in an unexpected way, as a court may be asked to make orders to adjust entitlements based on code which has not yet executed, but which cannot be prevented from executing.

Until decided cases or legislative guidance on the validity or enforcement of smart contracts is available, lawyers and their clients should be extremely careful when drafting and signing off on smart contracts or contracts relying on automated software inputs. Understanding at what stage liability attaches for the outcome of the operation of the code will become critical for those involved in preparing smart contracts in order to manage their risks.

**What will the future hold?**

Smart contract code isn't 'smart' enough to eliminate allegations of misrepresentation, misleading and deceptive conduct, negligent coding or security bugs or government regulation which may arise. There will always be a need for lawyers to provide advice and dispute resolution services for smart contract disputes.

However, one of the biggest challenges facing smart contract drafting and dispute resolution is likely to be the technological literacy of the legal profession. Lawyers with real world experience in coding and software development are rare, and those who can understand blockchain technology and deployments are rarer still. Until the day when lawyers are replaced by artificial intelligence working with smart contract code, lawyers should do their best to learn about how blockchain technology and smart contracts operate, as well as how they are being deployed and developed. Most importantly, lawyers will need to recognise their own technical limitations and seek specialist help when required.

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For further information and guidance on this ever-evolving area of law please contact Michael Bacina.