
**Understanding Smart Contracts:
An Analysis of their Nature, Effects and Enforcement
in terms of the Maltese Civil Code**

CHRISTINE BORG

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ABSTRACT AND KEYWORDS

Distributed Ledger Technology has generated plenty of excitement for the potential it has to enrich our lives. But it has also brought legal uncertainty as it fits either uneasily with established law or does not fit at all. Even worse is the use of terminology which brings confusion to the debate. One such artefact of DLT is the smart contract, and perhaps nothing else in the field has muddied the waters as much as this term. A 'smart contract' is really a software program that runs on a DLT. But its very designation confuses it with the more traditional legal contract. In consequence, perhaps the most common question that perplexes practitioners today is whether smart contracts can qualify as a valid contract in terms of the Maltese Civil Code. Analysis of the matter indicates that if a smart contract does meet the essential elements prescribed by law, then it can be deemed to qualify as a valid contract in terms of the Maltese Civil Code. However, legislative intervention may be necessary. At the end of the day, the words 'code is law' refer more to the way that software executes than a statement of fact about the legal nature of the smart contract.

Keywords: Smart Contract, Contract Law, Maltese Civil Code

REFLECTION

The beauty of contract law is found in its malleability to respond to innovative contract types and still serve its facilitation and regulatory functions.¹

¹ Larry A. DiMatteo, Michael Cannarsa and Cristina Poncibo, 'Smart Contracts and Contract Law' in Larry A. DiMatteo, Michael Cannarsa and Cristina Poncibo (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2020) 9.

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TABLE OF ABBREVIATIONS

AML	Anti-Money Laundering
Art.	Article, Articles
Cap.	Chapter
DLT	Distributed Ledger Technology
e.g.	<i>exempli gratia</i>
ed.	Editor
EU	European Union
i.e.	<i>id est</i>
ibid	<i>ibidem</i>
ITAS Act	Innovative Technology Arrangements and Services Act
L.N.	Legal Notice
MDIA	Malta Digital Innovation Authority
MDIA Act	Malta Digital Innovation Authority Act
MFSA	Malta Financial Services Authority
noe.	<i>nominee</i>
op. cit.	<i>opera citato</i>
pg.	page
pgs.	pages
pro.	<i>proprio</i>
Vol.	Volume
VFA Act	Virtual Financial Assets Act
v; vs	versus

TABLE OF JUDGEMENTS

Vincenzina Cassar et vs Annetto Xuereb Montebello, Court of Appeal (Civil, Superior), 28th May 1956

Margherita Fenech vs Pawla Zammit, First Hall, Civil Court, 12th April 1958

Mark Borda noe vs Rafel Muscat, First Hall, Civil Court, 23 May 1984

Alfred Delia v Segretarju Permanenti et, Court of Appeal (Inferior), 19th May 2004

Alfred Zarb et vs Mondial Travel Agency, Court of Appeal, 30th January 2009

George Farrugia et vs Pacifika Masini noe, First Hall, Civil Court, 7th January 2008

Mapfre Middlesea p.l.c. v Carmelo Saliba, Small Claims Tribunal, 9th January 2019

Software Solutions Partners Ltd, R (on the application of) v HM Customs & Excise, England and Wales High Court, Administrative Court, 2 May 2007

TABLE OF LEGISLATION

Local Legislation

Criminal Code	Cap. 9, Laws of Malta
Civil Code	Cap. 16, Laws of Malta
Interpretation Act	Cap. 249, Laws of Malta
Electronic Commerce Act	Cap. 426, Laws of Malta
Innovative Technology Arrangements and Services Act	Cap. 592, Laws of Malta
Malta Digital Innovation Authority Act	Cap. 591, Laws of Malta
Virtual Financial Assets Act	Cap. 590, Laws of Malta

Foreign Legislation

Arizona House Bill No. 2417, 2017

Illinois Blockchain Technology Act, LRB101 11071 RJF 56276 b

Nevada Senate Bill 398

Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC

Tennessee - Public Chapter No. 591, Senate Bill No. 1662

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CHAPTER 1: INTRODUCTION

1.1 The Scope of this Dissertation

Nick Szabo, in his 1994 paper entitled “Smart Contracts”, defined them as “*a computerized transaction protocol that executes the terms of a contract.*”² They are digital agreements written in software code which “*operate autonomously, transparently, and are basically tamper-resistant and immutable.*”³ They are enforced automatically once the conditions included in their code are met.⁴

Smart contracts have the potential of revolutionising the way contracts are concluded and, due to the rapid rate of their adoption, it is important to clarify their position at law:⁵ *are they binding contracts?* This is important because contracts permeate every aspect of life and there should be no questions about their validity. What is certain is that the fact that “smart contracts” are called “contracts” does not mean that they satisfy the conditions to be considered such at law. Do they operate in a legal vacuum, however?⁶

This dissertation will focus on the *nature, effects and enforcement of smart contracts* with the aim of understanding *whether a smart contract can qualify as a valid contract in terms of the Maltese Civil Code.* This is the central research question which will be tackled in the following manner:

- (a) A necessary preliminary is an exploration of the smart contract as an artefact of distributed ledger technology, including a discussion of the main characteristics of such technology, an overview of the salient definitions and features of smart contracts and an initial discussion relating to problems arising from their unfortunate nomenclature;
- (b) After obtaining a clear understanding of what constitutes a smart contract, this shall then be examined vis-à-vis the essential elements necessary for the validity of any contract in terms of Maltese Law namely:
 - (i) the capacity of the parties to contract;
 - (ii) the consent of the party who binds himself;
 - (iii) a certain thing which constitutes the subject-matter of the contract;

² Nick Szabo, ‘Smart Contracts’ (1994) [online] Available at: <http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.html> [Accessed 25 September 2020].

³ Maren K. Woebbeking, ‘The Impact of Smart Contracts on Traditional Concepts of Contract Law’ (2019) 10 (3) JIPITEC 106, para 1.

⁴ Joseph J. Bambara and Paul R. Allen, *Blockchain: A Practical Guide to Developing Business, Law, and Technology Solutions* (Kindle edition, McGraw-Hill Education, 2018) Kindle Locations 1509-1512.

⁵ Vitalik Buterin, *Ethereum White Paper: A Next Generation Smart Contract & Decentralised Application Platform* (2014) Available at: <<https://ethereum.org/en/whitepaper/>> [Accessed 25th September 2020].

⁶ Primavera De Filippi and Aaron Wright, *Blockchain and the Law: The Rule of the Code* (Harvard University Press, 2018) 78.

(iv) a lawful consideration⁷;

and, the requisite of form, if any;

- (c) Their effects and enforcement in the case of breach will also be tackled. Smart contracts are self-executing. While this is beneficial because it will reduce recourse to Courts and grant a remedy to those who would normally not seek judicial recourse, this will have to be assessed in the light of public policy. What is certain is that when dealing with smart contracts, the role of the Courts will change: they will no longer provide a remedy *ex ante* but rather *ex post*. The immutability of smart contracts will also raise significant challenges both from a technical and a legal point of view, particularly if the code contains bugs or errors or does not accurately reflect the intention of the parties;
- (d) If smart contracts do qualify as contracts in terms of Maltese law, are the current provisions adequate or is separate legislation necessary to deal with them specifically? *“Law mostly seems to be more reactive than proactive in dealing with fast technological and societal changes”*⁸ and tends to adopt a wait and see attitude. This is because strict regulation may hinder innovation, but a soft approach can, on the other hand, contribute to uncertainty;
- (e) However, if they are not contracts, what is their position at law?

1.2 Methodology and Literature Review

This dissertation is clearly not a quantitative study and does not focus on how many smart contracts are concluded when compared to traditional contracts. It is rather a qualitative study focusing specifically on smart contracts in the light of Maltese law. Private international law aspects are not taken into consideration because this merits a study unto itself. The focus is rather on the nature of smart contracts and the advantages and disadvantages these provide when compared to a traditional contract and, ultimately, their position in terms of the Maltese Civil Code. Moreover, although smart contracts may be implemented on both centralized infrastructures and on distributed ledger technologies (“**DLT**”), it is DLT smart contracts which shall be analysed in this dissertation due to resulting grey areas which may affect their position at law.

In terms of analysis, the starting point was to study the primary legislation in this area, namely the Civil Code,⁹ to obtain a clear understanding of what constitutes a contract in terms of Maltese law. This knowledge was used to critically analyse the definition of “smart contract” in the Malta Digital Innovation Authority Act¹⁰ (“**MDIA Act**”) and the Virtual Financial Assets Act¹¹ (“**VFA Act**”).

⁷ Art. 966, Civil Code, Cap. 16, Laws of Malta.

⁸ DiMatteo, Cannarsa and Poncibò (n 1) 3-4.

⁹ Cap. 16, Laws of Malta.

¹⁰ Cap. 591, Laws of Malta.

¹¹ Cap. 590, Laws of Malta.

There are no judgments which may provide guidance on the legal position of smart contracts in terms of the Civil Code. Therefore, reference to judgments was made to achieve clarity on the principles of law regulating contracts under Maltese law.

A review of existing literature was then carried out to determine what has already been written about smart contracts. Numerous books and journal articles were reviewed during the study. The conclusion reached is that authors have diametrically opposed views about whether smart contracts constitute legally binding contracts. On the one hand, some scholars believe that smart contracts will be regulated by existing contract law,¹² others predict that amendments will be necessary for smart contracts to be fully integrated into law,¹³ while others believe that smart contracts do not even qualify as contracts: “As *“smart contracts” are contracts in name only, trying to analyze them within the context of contract law resembles “trying to fit a square peg into a round hole.”*¹⁴ This set the scene to analyse and ultimately reach a conclusion regarding the question at the centre of this dissertation: *Is a smart contract a valid contract in terms of the Civil Code?* Unfortunately, the limited word count proved to be a significant limitation due to which only the major issues could be explored.

1.3 Conclusion

Blockchain was born to disrupt, and this it has done very well. Though its disruptive fruit is plentiful, one of the foremost is smart contracts. Their growing use makes it essential to discern if smart contracts constitute a valid contract in terms of Maltese law. Without legal certainty, contracting parties will have no knowledge of the legal implications arising from the use of smart contracts. This study endeavours to provide some of the answers.

¹² Max Raskin, ‘The Law and Legality of Smart Contracts’ (2017) 1 Georgetown Law Technology Review 305.

¹³ Alexander Savelyev, ‘Contract law 2.0: Smart contracts as the Beginning of the End of Classic Contract Law’ (2017) 26(2) Information & Communications Technology Law, 116.

¹⁴ Eliza Mik, ‘Smart Contracts: A Requiem’ (2019) Journal of Contract Law, Forthcoming, Available at SSRN: <https://ssrn.com/abstract=3499998> or <http://dx.doi.org/10.2139/ssrn.3499998>

CHAPTER 2: SETTING THE SCENE – WHAT IS A SMART CONTRACT?

When computers started to permeate all areas of life in the second part of the twentieth century, they added a new facet to the increasingly complex processes of society after the Industrial Revolution. This new facet was *logic*. Logic combined with automation has accelerated the momentum of progress beyond belief. From the hard border of the nation-state, society jumped into the Internet Age without pause for thought. The next phase of the internet rose in 2009 with the launch of the first DLT, Bitcoin. While Bitcoin was the first application of this technology, arguably even more exciting was the introduction of the first feasible smart contracts – a combination of automation, logic, and distributed infrastructure that promised to change the world forever.

2.1 DLT and the Birth of Smart Contracts

Smart contracts can be implemented on both DLT and centralized infrastructures; nonetheless, it is DLT smart contracts that are the subject of this study primarily due to the legal grey areas arising from properties which are particular to the DLT implementation of smart contracts as shall be seen below. For this reason, a basic overview of DLT is necessary to set the context.

DLT was first deployed to deliver the cryptocurrency Bitcoin in 2009 by the pseudonymous Satoshi Nakamoto.¹⁵ Nakamoto was motivated by the financial crisis at the time caused, in part, by the failure of trust needed to make currency work. As a solution, he proposed the cryptocurrency Bitcoin which is “*completely decentralized, with no central server or trusted parties, because everything is based on crypto proof instead of trust.*”¹⁶ The solution that Nakamoto found for the problem of delivering trust without a central authority was to make use of a ledger to record assets and transactions distributed on a peer-to-peer network making use of majority consensus, a proof-of-work algorithm and cryptography to secure the ledger, making it tamper-evident and resistant.¹⁷ The type of ledger that Nakamoto released for Bitcoin has come to be called a ‘blockchain’.

Blockchain is “*a distributed, transparent, immutable, validated, secured, and pseudo-anonymous database existing as multiple nodes such that if 51 percent of the nodes agree then trust of the chain is guaranteed.*”¹⁸ These nodes are “*the computers... of a peer-to-peer system*”¹⁹ on which there is a fully synchronized copy of the database. It is essentially a ledger distributed across all the nodes of the system, each page of which - a *block* - is linked through cryptographic mathematics to the preceding block. Each block has a unique

¹⁵ Satoshi Nakamoto, ‘Bitcoin: A Peer-to-Peer Electronic Cash System’ (2008) Available at <<https://bitcoin.org/en/bitcoin-paper>> [Accessed 12th May 2020].

¹⁶ Satoshi Nakamoto, ‘Bitcoin open source implementation of P2P currency’ (2009) Available at <https://satoshi.nakamotoinstitute.org/posts/p2pfoundation/1/> [Accessed 26th Oct 2020].

¹⁷ Bambara and Allen (n 4) Kindle Locations: 1509–13.

¹⁸ *ibid.*

¹⁹ Daniel Drescher, *Blockchain Basics* (Kindle edition, Berkeley, CA: Apress, 2017).

fingerprint (a hash number) that enables anyone to check whether the integrity of the block has been compromised. This makes it very easy to detect attempts at tampering, hence ‘tamper-evident’, and equally easy to rectify by rejecting the corrupt copy of the blockchain with a copy of the authoritative one, hence ‘tamper-resistant’, or ‘immutable’. Bitcoin was later joined by Ethereum which, unlike Bitcoin, was in fact a global distributed computer running on a blockchain.²⁰

The blockchain is called a ‘*distributed ledger*’ because unlike a normal database, it does not reside only on a centralized server and under strictly centralized authority. It is a “*trustless technology*”²¹ as it is the technology of disintermediation and decentralization cutting through cumbersome bottlenecks and maximizing the efficiency of transactions.

However, there are two broad categories of DLT, one of which is called ‘*open and public*’, or ‘**permissionless**’, such as Bitcoin and Ethereum, while the other is called ‘**permissioned**’ or ‘*private*’. The fundamental difference is that while both are distributed in a technological sense, in terms of governance, permissionless DLTs are truly decentralized with each participant, or node, having equal privileges in the network, while in permissioned DLTs, nodes do not have equal privileges, with full privileges residing to a limited number of nodes. This means that permissioned DLTs have technologies that can get around the hardened immutability that permissionless DLTs need to ensure trust in the wild environment of a decentralized online network.²² For this reason, this dissertation focuses on permissionless DLTs since it is on these DLTs that smart contracts acquire properties that give rise to legal grey areas requiring research and study. For the sake of completeness, one must also mention that **hybrid systems** also exist having features of both permissioned and permissionless DLTs. These vary depending on the degree of centralisation achieved.

Smart contracts may have originated in the Berlin Airlift of 1948 in the “*manifest system that could be transmitted by telex, radio-teletype, or telephone*”²³ which the U.S. Army developed to keep records of the cargo which was sent to West Berlin after the Soviet Union cut off road and sea access to Western Germany.²⁴ This led to the Electronic Data Interchange in 1965 which involves the digitisation of paper documents and the transfer of information from one place to another.²⁵ This, however, did not change the way parties contracted, unlike Nick Szabo’s smart contract which relies on cryptographic protocols and makes it difficult for parties not to perform their obligations due to its automation.²⁶ Since then, there have been numerous attempts to transact through code, the most notable being Ian Grigg’s Ricardian Contract which may be read by both humans and machines and Harry Surden’s “computable” contract terms which involve the “*representation of contractual obligations as data.*”²⁷ The release of Vitalik Buterin’s Ethereum in 2015 brought the

²⁰ Bambara and Allen (n 4) Kindle Locations: 1509–13.

²¹ Jean Paul Fabri and Stephanie Fabri, ‘Blocknomics’, in Patrick L. Young and Joseph A Debono (eds), *DLT Malta: Thoughts from the Blockchain Island* (DV Books 2019) 105.

²² Bambara and Allen (n 4) Kindle Locations 773-784.

²³ Frank Hayes, ‘The Story So Far’ (2002) Available at: <http://www.computerworld.com/article/2576616/e-commerce/the-story-so-far.html> [Accessed 29th September 2020].

²⁴ De Filippi and Wright (n 6) 72.

²⁵ *ibid.*

²⁶ *ibid* 73.

²⁷ *ibid* 74.

deployment of smart contracts to DLT and, indeed, currently the best known type of smart contract is that implemented on Ethereum,²⁸ a “blockchain with a built-in Turing-complete programming language, allowing anyone to write smart contracts and decentralized applications.”²⁹

2.2 Definition and Features

The term “smart contract” was coined by Nick Szabo in 1994 when he used this wording to define “a computerized transaction protocol that executes the terms of a contract.”³⁰ In simple terms, it is an agreement wherein promises are “specified in digital form”,³¹ its terms programmed as *modus ponens*, “if this, then that”, logic.³² This last phrase portrays an essential feature of smart contracts: *automated execution*.³³

2.2.1 Automation

As a computer program, it executes automatically when the conditions included in its code are satisfied,³⁴ and this without the intervention of any person, not even that of the parties to the contract itself.³⁵ Indeed, while in natural language contracts it is the parties who perform their contractual obligations, in smart contracts these are performed automatically upon a triggering event.

A smart contract encodes the terms of an automatic exchange of transactions according to specified conditions. At each stage of the contract, it updates the state (mode) involved in the execution of the contract. The code of the smart contract, the current state of the state machine and the transacted asset are all stored on the blockchain and the smart contract is executed by the DLT’s virtual machine. A smart contract comes with its own account (generally called a “contract account” or a “smart contract account”) that enables it to hold units of that DLT’s assets and transact them. A smart contract may need³⁶ to consult external oracles to see if the conditions specified for its execution have been met. Accounts transacting with and through the smart contract are controlled by public-private key pairs. Each transaction is therefore guaranteed and validated by cryptographic mathematics.³⁷ This makes it exceptionally difficult to forge a transaction. Smart contracts are distributed

²⁸ *ibid* 78.

²⁹ <https://bibox.zendesk.com/hc/en-us/articles/115004793633-ETH-Ethereum->.

³⁰ Szabo, Smart Contracts (n 2).

³¹ Nick Szabo, ‘Smart Contracts: Building Blocks for Digital Markets’ (1996) [online] Available at: <https://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.2.html> [Accessed 29 September 2020].

³² Riccardo Caria, ‘Definitions of Smart Contracts’, in Larry A. DiMatteo, Michel Cannarsa and Cristina Poncibò (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2020) 24.

³³ Michèle Finck, *Blockchain regulation and Governance in Europe* (Cambridge University Press 2018) 23.

³⁴ Bambara and Allen (n 4) Kindle Locations 1509-1512.

³⁵ Oracles will be explained below.

³⁶ Andreas M. Antonopoulos, *Mastering Bitcoin: Programming the Open Blockchain* (2nd edn, O’Reilly Media, 2018) 211-214.

³⁷ Drescher (n 19).

because they exist on a DLT protocol distributed across several nodes.³⁸ Therefore, they benefit from the security, permanence and immutability offered by the blockchain.³⁹

While automation is a distinguishing feature of smart contracts, they are, however, not to be considered mere automated processes. They are not comparable to vending machines which dispense products automatically when an item is chosen from a display and payment is made. Indeed, they are much more than this: they are *“one of the varied decentralized applications that can run on a blockchain infrastructure”*⁴⁰ and although they can exist on other networks, they are particularly effective on permissionless blockchains where no one party can interfere with their execution.⁴¹ Indeed, the tamper-proof nature of the blockchain ensures that smart contracts are not stopped or controlled by one party.

2.2.2 Self-Executing and Self-Enforcing

Smart contracts *“self-execute, self-enforce, self-verify and self-constrain.”*⁴² In the words of Szabo himself: *“The general objectives of smart contract design are to satisfy common contractual conditions (such as payment terms, liens, confidentiality and even enforcement), minimize exceptions both malicious and accidental, and minimize the need for trusted intermediaries.”*⁴³

Smart contracts are also self-enforcing of *“the contract built into the code”*⁴⁴ and are governed by it, and this not only brings about certainty of outcome but also limits third-party interference which may be time consuming and costly: *“the facts are available to the contract, so it cannot make the wrong decision.”*⁴⁵ Therefore, for example, a smart contract will transfer payment if its conditions are met or will transfer the collateral automatically in the case of default. Smart contracts have also brought about the idea that tribunals and courts will no longer be necessary, but this will be examined further below. For the moment, it suffices to state that contract remedies will continue to play a role due to the unpredictability of future events.⁴⁶ Smart contracts are not above the law and self-enforcement may be subject to *post hoc* judicial review.⁴⁷

³⁸ Melanie Swan, *Blockchain: Blueprint for a New Economy* (O'Reilly Media, 2015) 16.

³⁹ Stuart D. Levi and Alex B. Lipton, *An Introduction to Smart Contracts and their Potential and Inherent Limitations*, Harvard Law School forum on Corporate Governance, 2018.

⁴⁰ Finck (n 33) 23.

⁴¹ *ibid.*

⁴² Tim Swanson, *Great Chain of Numbers: A Guide to Smart Contracts, Smart Property and Trustless Asset Management* (Kindle Edition, 2014) 312.

⁴³ Szabo, Smart Contracts (n 2).

⁴⁴ The 2018 Joint Economic Report, Report of the Joint Economic Committee, Congress of the United States on the 2018 Economic Report of the President, Chapter 9: “Building a Secure Future, One Blockchain at a Time” (13 March 2018) <https://www.congress.gov/115/crpt/hrpt596/CRPT-115hrpt596.pdf>.

⁴⁵ Bambara and Allen (n 4) Kindle Locations: 1509–13.

⁴⁶ Cristina Poncibò and Larry A. DiMatteo, ‘Smart Contracts Contractual and Noncontractual Remedies’ in Larry A. DiMatteo, Michael Cannarsa and Cristina Poncibò (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2020) 119.

⁴⁷ *ibid.* 121.

It is undeniable, however, that smart contracts provide a remedy where enforcement through traditional remedies may not be practical or may be too costly.⁴⁸ What is certain is that there will be a shift in trust: in traditional contracts, trust is placed in the agreement itself and in the other contracting party that the obligations agreed to will be fulfilled. In a smart contract, *trust is placed in the computer algorithm standing behind the agreement ('trustless trust')*.⁴⁹

Some claim that the efficiency of smart contracts is an illusion and a cognitive impossibility⁵⁰ as their self-sufficiency generally depends on input from *oracles* which provide *“real-world parameters for coded self-performance and extending to other links to ensure contract content validation, contract legality, lawfulness of contract purpose, and measurement of contract results.”*⁵¹ However, oracles are also seen as a point of failure as they dilute the decentralised benefits of smart contracts. Moreover, contracting parties must also address the possibility of oracles being unable to provide the necessary data or providing erroneous data. Therefore, as seen above, there are limitations to a smart contract’s self-sufficiency.

2.2.3 Immutability

By operating autonomously, DLT smart contracts provide a level of transparency as they are essentially *“tamper-resistant and immutable”*⁵²: *“they follow their rules until the established goal is reached or the resources attached consumed.”*⁵³ They cannot be stopped unless this possibility is programmed into the code itself. Immutability means that the smart contract code cannot be changed or reversed ensuring that the agreement is performed as originally agreed by the parties. Because of this, smart contracts are touted as reducing costs by guaranteeing performance.⁵⁴

While the immutability of DLT smart contracts has its advantages, it also gives rise to several issues, the main one being inflexibility. Although computer language eliminates any ambiguity in interpretation which may arise from the use of natural language, it also removes any flexibility and discretion afforded by legal contracts.⁵⁵ *“Smart contracts are indeed unable to match the linguistic ambiguity and enforcement discretion ingrained in legal contracts.”*⁵⁶ Moreover, not all provisions can be translated into code but only those which can be converted into “if-then” statements.

Remedial action may also be problematic on two counts: (i) while the law fills gaps in agreements through default rules, this is not possible in the case of computer code which

⁴⁸ *ibid* 119.

⁴⁹ Savelyev (n 13) 123.

⁵⁰ Poncibò and DiMatteo (n 46) 120.

⁵¹ DiMatteo, Cannarsa and Poncibò (n 1) 16.

⁵² Woebbeking (n 3) para 7.

⁵³ Pierluigi Cuccuru, ‘Beyond bitcoin: an early overview on smart contracts’ (2017) 25 (3) *International Journal of Law and IT*, 179.

⁵⁴ Eliza Mik, ‘Blockchains A Technology for Decentralised Marketplaces’, in Larry A. DiMatteo, Michael Cannarsa and Cristina Poncibò (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2020), 173.

⁵⁵ Finck (n 33) 26, 27.

⁵⁶ *ibid* 142.

will only act if it is programmed to do so. This is because “*smart contracts lack the capacity to adapt and prevent the transacting parties from adjusting their positions due to a change of circumstances.*”⁵⁷; and (ii) unintended smart contract transactions may not simply be reversed as in the case of traditional contracts. Finally, it is wrong to associate immutability with the veracity and authenticity of information. This depends on the trustworthiness of third parties: “*those who tag, map and register off-chain assets*”⁵⁸ – “*if the recorded data is incorrect, the record is incorrect.*”⁵⁹ Immutability becomes problematic if the data recorded on the blockchain is incorrect and cannot be altered.

2.3 Problems with Nomenclature

2.3.1. Are they smart?

The nomenclature of smart contracts is unfortunate.⁶⁰ Nick Szabo “*called these new contracts “smart”, because they are far more functional than their inanimate paper-based ancestors ...*”⁶¹ as they execute automatically. Moreover, although nowadays “smart” seems to refer to artificial intelligence, in his definition, Szabo states “*no use of artificial intelligence is implied.*”⁶² This is the position of other authors: “*smart contracts don’t think*”⁶³ and “*smart contracts do not need artificial intelligence to work regardless of what their name suggests.*”⁶⁴ They cannot understand the terms of the contract or unilaterally verify if an event relevant to such terms has occurred. They must rely on external sources, oracles, which feed them with information and act as a bridge between the world and the blockchain⁶⁵ before they can execute a transaction.

2.3.2. Are they contracts?

The use of the word “contract” is also misleading.⁶⁶ It is not clear whether smart contracts are complete and self-standing on their own or necessarily form part of a broader arrangement. When the broader arrangement is already a valid contract, then the smart contract is merely a feature of that contract. In such cases, the smart contract will generally carry out administrative processes.

⁵⁷ Oscar Borgogno, ‘Usefulness and Dangers of Smart Contracts in Consumer Transactions’, in Larry A. DiMatteo, Michael Cannarsa and Cristina Poncibò (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2020) 292.

⁵⁸ Mik, ‘Blockchains A Technology for Decentralised Marketplaces’ (n 54) 172.

⁵⁹ *ibid* 173.

⁶⁰ Eliza Mik, ‘Smart Contracts: Terminology, Technical Limitations and Real World Complexity’ (2017) Available at SSRN: <<https://ssrn.com/abstract=3038406>> [Accessed 12th May 2020].

⁶¹ Szabo, ‘Smart Contracts: Building Blocks for Digital Markets’ (n 31).

⁶² <https://nakamotoinstitute.org/smart-contracts-glossary/>

⁶³ Gabriel Jaccard, ‘Smart Contracts and the Role of Law’ (2018) Available at SSRN: <https://ssrn.com/abstract=3099885> or <http://dx.doi.org/10.2139/ssrn.3099885>

⁶⁴ Kristian Lauslahti, Juri Mattila & Timo Seppälä, ‘Smart Contracts – How will Blockchain Technology Affect Contractual Practices’ (2017), Available at: <https://pub.etla.fi/ETLA-Raportit-Reports-68.pdf>.

⁶⁵ Finck (n 33) 25.

⁶⁶ Mateja Durovic and André Janssen, ‘Formation of Smart Contracts under Contract Law’ in Larry A. DiMatteo, Michel Cannarsa and Cristina Poncibò (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2020) 63.

The legal nature of smart contracts has been the subject of numerous debates primarily among technologists and lawyers: the former consider them to be “*digital instructions designed to give execution to an agreed sequence of events*”,⁶⁷ while the latter agree that they do not operate in a legal vacuum,⁶⁸ and therefore consequences will be incurred in case of negligence or illegality.⁶⁹ However, do they give rise to legal implications⁷⁰ or are they themselves *legal* contracts in their own right?⁷¹ De Caria, Werbach and Cornell, and Catchlove⁷² are of the opinion that smart contracts do satisfy the elements necessary for valid contracts: “*smart contracts are just technological manifestations of familiar contractual processes.*”⁷³ Michèle Finck, on the other hand, opines that “*while smart contracts can... be useful in contractual settings... they are not legal contracts per se but computer code that can be used to produce legal effects.*”⁷⁴

2.4 Legal Definitions

In July 2018, in furtherance of Malta’s policy to support technology innovation, the Maltese Parliament enacted the Malta Digital Innovation Authority Act⁷⁵ (“**MDIA Act**”), the Innovative Technology Arrangements and Services Act⁷⁶ (“**ITAS Act**”) and the Virtual Financial Assets Act⁷⁷ (“**VFA Act**”). These reflect Malta’s policy orientation to approach the sector holistically while establishing high standards across the board without hindering innovation.

The MDIA Act establishes the Malta Digital Innovation Authority (“**MDIA**”) and aims to promote the development of the innovative technology sector through regulation without, however, hindering innovation. The MDIA, *inter alia*, regulates, monitors and supervises innovative technology arrangements and innovative technology services in or from Malta.⁷⁸

The ITAS Act is the licensing law for this sector and applies to “*any person who desires to obtain recognition for any innovative technology arrangement or any innovative technology service as stated in the Schedules.*”⁷⁹ It provides for the certification of Innovative Technology

⁶⁷ Marco Dell’Erba, ‘Demystifying technology. Do smart contracts require a new legal framework? Regulatory fragmentation, self-regulation, public regulation’ (2018) University of Pennsylvania Journal of Law & Public Affairs (forthcoming) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3228445> [Accessed 12th May 2020].

⁶⁸ De Filippi and Wright (n 6) 78.

⁶⁹ *ibid.*

⁷⁰ Finck (n 33) 25.

⁷¹ Stéphane Blemus, *Law and Blockchain: A Legal Perspective on Current Regulatory Trends Worldwide* (2017) 4, Corporate Finance and Capital Markets Law Review RTDF, 13.

⁷² Caria (n 32); Kevin Werbach and Nicolas Cornell, ‘Contracts Ex Machina’ (2017) 67 Duke Law Journal 313–370; Paul Catchlove, ‘Smart Contracts: A New Era of Contract Use’ (2017) Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3090226.

⁷³ Werbach and Cornell (n 72) 324.

⁷⁴ Finck (n 33) 25.

⁷⁵ Cap. 591, Laws of Malta.

⁷⁶ Cap. 592, Laws of Malta.

⁷⁷ Cap. 590, Laws of Malta.

⁷⁸ Art. 6(3), MDIA Act.

⁷⁹ Art. 5(1), ITAS Act.

Arrangements⁸⁰ and the registration of Innovative Technology Service Providers.⁸¹ This is a voluntary certification⁸² administered by the MDIA.

The VFA Act is “an act to regulate the field of Initial Virtual Financial Asset Offerings and Virtual Financial Assets and to make provision for matters ancillary or incidental thereto or connected therewith.”⁸³ It establishes a mandatory authorization regime, licensing requirements and ongoing obligations applicable to service providers. Its objectives are investor protection, market integrity and financial soundness.

A definition of “smart contract” may be found in the MDIA Act and the VFA Act wherein it is defined as:

“smart contract” means a form of innovative technology arrangement consisting of:

(a) a computer protocol; and, or

(b) an agreement concluded wholly or partly in an electronic form, which is automatable and enforceable by execution of computer code, although some parts may require human input and control and which may be also enforceable by ordinary legal methods or by a mixture of both.⁸⁴

(There are some differences in the definition between the two Acts: the parts underlined are found in the MDIA Act but not in the VFA Act).

A smart contract is “a form of innovative technology arrangement” which consists of the “software, codes, computer protocols and other architectures which are used in the context of DLT, smart contracts and related applications.”⁸⁵ In the First Schedule of the ITAS Act, an innovative technology arrangement is described as including “smart contracts and related applications, including decentralised autonomous organisations, as well as other similar arrangement.”

The definition of “smart contract” is significant for several reasons. It is a *wide definition* which recognises that a smart contract may consist of a protocol (technological aspect) or an agreement (legal aspect). Although it is unclear whether this is an oversight or intentional, the definition in the MDIA Act is actually wider as the word “and” allows smart contracts which are technology and law hybrids and does not restrict them to one or the other, as the definition in the VFA Act perhaps inadvertently does. *By combining the two, the advantages of both legal agreements and code-based rules become simultaneously available, without a party necessarily having to choose one over the other.*⁸⁶

⁸⁰ Art. 7-8, ITAS Act.

⁸¹ Art. 9-11, ITAS Act.

⁸² Art. 8, ITAS Act.

⁸³ Preamble, VFA Act, Cap. 590, Laws of Malta.

⁸⁴ Art. 2(1), MDIA Act.

⁸⁵ Art. 2(1), MDIA Act.

⁸⁶ De Filippi and Wright (n 6) 78.

Moreover, the definition does not restrict smart contracts to a particular technology, and this is in stark contrast to the narrower definition introduced in Arizona which defines a smart contract as an “*event-driven program, with state that runs on a distributed, decentralized, shared and replicated ledger and that can take custody over and instruct transfer of assets on that ledger*”,⁸⁷ which seems to restrict the definition of “smart contracts” to those deployed on Ethereum.⁸⁸

The State of Tennessee⁸⁹ has also introduced a definition of smart contracts which is very similar to that of Arizona but adds that the “*event-driven computer program ... is used to automate transactions, including, but not limited to, transactions that:*

- (A) *Take custody over and instruct transfer of assets on that ledger;*
- (B) *Create and distribute electronic assets;*
- (C) *Synchronize information; or*
- (D) *Manage identity and user access to software applications.”*

The State of Illinois in its *Blockchain Technology Act* defined smart contract as “*a contract stored as an electronic record which is verified by the use of a blockchain.*”⁹⁰ Nevada⁹¹ has adopted a similar definition. These definitions, like the Maltese definition, are wide and flexible, ensuring that they remain relevant as the technology progresses.⁹²

2.5 Conclusion

There is somewhat of a misconception about smart contracts to the effect that they are intrinsically dependent on DLT. This is not entirely accurate. A smart contract can be coded and deployed on a centralized server such as a corporate online platform. It is true however that the truly disruptive qualities of this technology arise in the decentralized environment of a permissionless DLT. With the properties they acquire on such a decentralized ledger, they seem likely to revolutionize even the way legal contracts are drawn up and executed. This, however, will largely depend on the legal certainty this technology acquires. Smart contracts will affect many areas of law, but only contract law falls within the scope of this analysis. Therefore, private international law and data protection issues will not be considered.

⁸⁷ Arizona House Bill No. 2417, 2017, Available at: <https://www.azleg.gov/legtext/53leg/1r/bills/hb2417p.pdf>.

⁸⁸ Andreas Antonopoulos and Gavin Wood, *Mastering Ethereum* (O’Reilly Media, 2019), Kindle Location: 2959.

⁸⁹ Public Chapter No. 591 – Senate Bill No. 1662. Available at: <https://publications.tnsosfiles.com/acts/110/pub/pc0591.pdf>.

⁹⁰ Blockchain Technology Act, State of Illinois LRB101 11071 RJF 56276 b; Available at: <https://ilga.gov/legislation/fulltext.asp?DocName=10100HB3575&GA=101&SessionId=108&DocTypeId=HB&LegID=120249&DocNum=3575&GAID=15&Session=>

⁹¹ “Smart contract” means a contract stored as an electronic record pursuant to chapter 719 of NRS which is verified by the use of a blockchain. Chapter 719 is the Electronic Transactions (Uniform Act). Nevada Senate Bill 398; Available at: https://www.leg.state.nv.us/Session/79th2017/Bills/SB/SB398_EN.pdf.

⁹² Lara Tanti and Max Ganado, ‘Regulating Smart Contracts’ in Patrick L. Young and Joseph A Debono (eds), *DLT Malta: Thoughts from the Blockchain Island* (DV Books 2019) 237.

CHAPTER 3: SMART CONTRACTS AND THE ESSENTIAL ELEMENTS FOR THE VALIDITY OF CONTRACTS

Technological innovation can be challenging to law as such innovation can slip outside the structures of established legislation. Until legislative intervention occurs, a new technology does not often align with an existing legal framework. Indeed, there have been numerous debates on whether smart contracts qualify as legal contracts under the traditional legal doctrine.

There are two main views on this matter:⁹³

- (a) some authors do not consider smart contracts to be legally binding contracts:⁹⁴ *“smart contracts are not legally binding contracts in a technical meaning. Rather, they are an instrument for their conclusion or automatic enforcement, a channel for the execution of online agreements, not really agreements in themselves”*⁹⁵;
- (b) others are of the opinion that they are legally binding contracts:⁹⁶ *“Nevertheless, we believe that smart contracts are, at the conceptual level, still contracts.”* Werbach and Cornell do state however, *“Though they might not constitute promises per se—depending on how we understand that idea—smart contracts are agreements that purport to alter the rights and duties of the parties.”*⁹⁷

Legally, a smart contract will only be considered a contract if it satisfies the conditions imposed by law. The aim of this chapter is to analyse whether smart contracts satisfy the essential elements necessary for the validity of a contract in terms of the Maltese Civil Code⁹⁸ to qualify as such in terms of Maltese law.

3.1. What is a contract?

*A contract is an agreement or an accord between two or more persons by which an obligation is created, regulated, or dissolved.*⁹⁹ It involves a meeting of the minds wherein one person’s offer is accepted by another person, resulting in unity of consents and ultimately a contract.¹⁰⁰ Contracts have the force of law between the parties¹⁰¹ and may only be terminated or revoked by them or on grounds permitted by law.¹⁰² Through legal

⁹³ Argun Karamanlioğlu, ‘Concept of Smart Contracts – A Legal Perspective’ (2018)35 KOSBED 29-42.

⁹⁴ Cuccuru (n 53) 185.

⁹⁵ *ibid* 184.

⁹⁶ Savelyev (n 13) 123; Werbach and Cornell (n 72) 338.

⁹⁷ Werbach and Cornell (n 72) 342.

⁹⁸ Cap. 16, Laws of Malta.

⁹⁹ Art. 960, Civil Code.

¹⁰⁰ Max Ganado, ‘The Essential Elements of a Contract’, in Max Ganado (ed.) *An Introduction to Maltese Financial Services Law* (Valletta, Malta: Allied Publications, 2009) 95.

¹⁰¹ Art. 992(1), Civil Code.

¹⁰² Art. 992(2), Civil Code.

dispositions, the discussion between the parties is elevated to an agreement which is recognised and enforced at law.¹⁰³

For a contract to be validly formed, the following essential elements must be satisfied:

- “(a) the capacity of the parties to contract;*
- (b) the consent of the party who binds himself;*
- (c) a certain thing which constitutes the subject-matter of the contract;*
- (d) a lawful consideration.”¹⁰⁴*

If these essential elements exist, the parties may enter into *any* agreement provided this is not impossible, immoral, prohibited by law or contrary to public policy. A contract may have specific requirements depending on its type. However, focus will be made on the aforementioned essential elements as these form the basis of all contracts.¹⁰⁵ If any one of these elements is missing, the contract is defective and may be rescinded¹⁰⁶ because it will be deemed not to meet the basic requisites of the law to produce the important legal effects described above.

One may also add *form* to the aforementioned elements as the law may, in some cases and on the basis of particular policy considerations, require that an agreement be drawn up using a particular form, for example, contracts of sale of immovable property must be drawn up by public deed to be valid.

Before analysing each essential element in turn, it is important to examine the definition of “smart contract” found in the MDIA Act and the VFA Act from the point of view of contract law. This definition is being repeated below for the sake of convenience. In these Acts, a smart contract is defined as:

- “smart contract” means a form of innovative technology arrangement consisting of:*
- (a) a computer protocol; and, or*
- (b) an agreement concluded wholly or partly in an electronic form, which is automatable and enforceable by execution of computer code, although some parts may require human input and control and which may be also enforceable by ordinary legal methods or by a mixture of both.¹⁰⁷*

Therefore, in terms of Maltese law, a smart contract is:

- (a) “an agreement”:* the word “agreement” links this definition to that of “contract” in Art. 960 of the Civil Code wherein this is defined as “an agreement or an accord”;

¹⁰³ Cheng Lim, TJ Saw and Calum Sargeant, ‘Smart Contracts: Bridging the Gap Between Expectation and Reality’ (2016) Oxford Business Law Blog, <https://www.law.ox.ac.uk/business-law-blog/blog/2016/07/smart-contracts-bridging-gap-between-expectation-and-reality>.

¹⁰⁴ Art. 966, Civil Code.

¹⁰⁵ Art. 965, Civil Code.

¹⁰⁶ Art. 1212, Civil Code.

¹⁰⁷ Art. 2(1), MDIA Act.

- (b) *“concluded wholly or partly in an electronic form”*: this wording is used in the definition of “electronic contract” in the Electronic Commerce Act¹⁰⁸ wherein it is defined as *“a contract concluded wholly or partly by electronic communications or wholly or partly in an electronic form.”*¹⁰⁹ Electronic contracts are not self-executing and in such cases the focus is on how contracts may be concluded digitally across computer networks rather than on automated performance;
- (c) *“automatable and enforceable”*: unlike traditional contracts, smart contracts are not executed through human involvement. Once their conditions are satisfied, the agreement is fulfilled and, as with all steps in the process, the performance is recorded on the blockchain. Automated performance takes place *“by execution of computer code”*. The legislation does concede, however, that *“some parts may require human input and control”*, referring to oracles which may be required to feed information to the code and to confirm that an obligation has been performed. Due to such automated execution, there must be increased attention during the drafting phase of the smart contract. Significant technical support will be needed at this stage so that suitable and accurate if-then instructions are programmed in the code;
- (d) *“enforceable by ordinary legal methods or by a mixture of both”*: automation is beneficial because *“there is no need for the courts or mediation – the facts are available to the contract, so it cannot make the wrong decision.”*¹¹⁰ This reduces the risk of litigation.¹¹¹ While this, *prima facie*, seems to be beneficial, because it helps avoid the uncertain outcomes of litigation, parties sometimes decide not to enforce contractual rights to further their business relationships. Indeed, parties often amend contracts to address issues which arise after the conclusion of a contract.¹¹² Smart contracts prevent such adjustments.

It is important to distinguish between a contract and the conditions which constitute it. A contract reflects the main agreement. It generally has a lot of stipulations which make sense in the real world of time and space and that means that the time for performance is set, the place of performance is set and the modalities on how performance is to be carried out are established. These are not considered contracts in themselves, although they are agreements. They cannot live on their own as they are part of a contract and assume the main obligations which may be sale or lease or another contract. These conditions and modalities define a lot about performance and give contracts width and depth in the context agreed demonstrating the will of the parties on the details. When all a smart contract does is to operate as a condition or a supporting modality or stipulation, then it is not a contract but a mere appendage to support the performance of the contract between the parties.

¹⁰⁸ Cap. 426, Laws of Malta.

¹⁰⁹ Art. 2, Cap. 426.

¹¹⁰ Bambara and Allen (n 4) 1509.

¹¹¹ Durovic and Janssen (n 66) 62.

¹¹² Borgogno (n 57) 62.

3.2. The Conditions Essential to the Validity of Contracts

3.2.1 The Capacity of the Parties to Contract

This denotes a person's ability to enter into a contract. Persons who are “*not under a legal disability are capable of contracting.*”¹¹³ Incapacity is an exception and must be proved. In the case of natural persons, “*minors, persons interdicted or incapacitated and generally those to whom the law forbids certain contracts*”¹¹⁴ are considered incapable of contracting, as are persons who do not have the use of reason. Issues relating to age or mental capacity arise because such persons do not understand the implications of entering into a binding contract. The aim is to ensure that all parties have equal bargaining power. The law does provide certain exceptions, for example, those related to age¹¹⁵ (a minor may enter into a contract when this contains obligations in his favour) or when a minor is subject to parental authority or provided with a curator.¹¹⁶

Persons in religious orders, married persons, parents and agents have varying limitations on their ability to contract.¹¹⁷ If a legal person enters a contract, this must be in conformity with its purposes and objects. In case of default, the contract is invalid. Legally, these limitations still apply in the case of smart contracts when they qualify as contracts.¹¹⁸ “*As seen with traditional contracts, if the parties lack that requirement (capacity) the consequences would permeate onto the smart contract itself.*”¹¹⁹

To be able to ascertain capacity, one must first identify the contracting parties. This is important from a due diligence point of view. In a traditional scenario, parties are identified through official documentation used by contracting parties to fulfil their AML obligations and to establish any issues of capacity. A notary or a lawyer¹²⁰ is generally involved but this is unlikely in a blockchain scenario due to the disintermediation which characterizes this technology.

In a blockchain there are no meaningful checks on identity – the identity of parties is reduced to mere addresses - strings of numbers and letters. Transactions take place between parties who are identified through mere pseudonyms or who are anonymous, not solely to third parties but even to each other. On a technical level, the contracting parties are “*cryptographic private keys which represent individual persons.*”¹²¹ Most blockchain platforms cannot test for capacity and do not verify whether any one of the contracting

¹¹³ Art. 967(1), Civil Code.

¹¹⁴ Art. 967(3), Civil Code.

¹¹⁵ Art. 969, Civil Code.

¹¹⁶ Art. 970, Civil Code.

¹¹⁷ Ganado (n 100) 95.

¹¹⁸ Andreas M. Antonopoulos, *The Internet of Money Volume Three: A Collection of Talks by Andreas M. Antonopoulos* (Merkle Bloom LLC, 2019) 19.

¹¹⁹ Emma Blake, ‘Smart contracts: legal regulation in a decentralized environment’ (LL.B., University of Malta 2019) 29.

¹²⁰ Alexandra Vella, ‘A Critical Analysis of The Architect’s Professional Liability’ (LL.D. Thesis, University of Malta 2010) 72.

¹²¹ Werbach and Cornell (n 72) 371.

parties has legal capacity to enter transactions.¹²² Anyone can open an account and enter into a contract irrespective of age or mental ability.

Moreover, it is an assumption that the contracting parties will be persons. With the advent of the internet of things, these may be inanimate objects and smart contracts may interact with other smart contracts¹²³ and transfer assets to each other.¹²⁴ It does not mean that legal issues may be avoided because the counterparties are objects. Who are the parties in this case? Are they the computer systems generating the contract?¹²⁵ This is not possible in terms of Maltese law wherein contracting parties must be natural or legal persons. The contracting parties may possibly be the persons who programmed or commissioned the smart contract¹²⁶ which is therefore acting as their agent.¹²⁷ The UK Court in *Software Solutions Partners Ltd, R (on the application of) v HM Customs & Excise*¹²⁸ decided against this stating that an automated system cannot be considered to be an agent as even an agent must, at law, have capacity. (It is interesting to note, however, that while a minor is generally deemed incapable of contracting, he may be a mandatory as the general rule is that one must look at the capacity of the principal and not the agent). Rather than an agent, the computer system may be considered a “*communication on behalf of a contracting party*”¹²⁹ who programmed the computer or instructed a developer or a system to record his wishes. This may be complex as various persons may have contributed to the programming of the smart contract, and this at various stages of its development.

With the current provisions of law, it is perhaps too risky to enter into a smart contract and rely on “*speculative smart contract-friendly interpretations*”¹³⁰ of the current rules. The best solution appears to be a ‘code-and-paper contract’ hybrid wherein the paper contract will ensure that all the requirements at law are satisfied while the smart contract will bring about certainty of performance. This may potentially solve issues of errors in the code. If the identity of the contracting parties is known, the contract may potentially be modified to correct any potential errors. Alternatively, the parties may seek legal redress either to annul the transaction or to recover any damages due.

Entering into code-and-paper hybrid contracts is time-consuming and will create problems in the business world which is driven by efficiency. Therefore, unless the technology improves to bring about certainty of the identity of the contracting party and his capacity, it is suggested that provisions are included in the law to specifically deal with the legal requirements for the execution of smart contracts. Legislative intervention will therefore be

¹²² Durovic and Janssen (n 66) 71.

¹²³ Norton Rose Fulbright, *Smart Contracts: coding the fine print. A legal and regulatory guide*, 03/16 (UK) 20;

¹²⁴ Antonopoulos and Wood (n 88) Kindle Location: 2959.

¹²⁵ Tanti and Ganado (n 92) 240.

¹²⁶ Emily M. Weitzenboeck, ‘Electronic Agents and the Formation of Contracts’ (2001) 9 (3) *International Journal of Law and Information Technology*, 2001.

¹²⁷ *ibid.*

¹²⁸ *Software Solutions Partners Ltd, R (on the application of) v HM Customs & Excise*, England and Wales High Court (Administrative Court) (2 May, 2007).

¹²⁹ Tanti and Ganado (n 92) 241.

¹³⁰ Clifford Chance, ‘Are Smart Contracts Contracts? Talking Tech Looks at the Concepts and Realities of Smart Contracts’, December 2017, <https://talkingtech.cliffordchance.com/en/emerging-technologies/smart-contracts/are-smart-contracts-contracts.html>.

necessary even though digital technology is often promoted as “*being immune to regulatory interference.*”¹³¹

3.2.2 *The Consent of the Party who binds himself*

For a contract to be valid there must be “*the concurrence of the identical wills of the contracting parties.*”¹³² Consent must mirror a person’s intentions and free will and must be “*serious, definitive and unconditional.*”¹³³ In traditional contracts parties are free to manifest consent as they wish, whether verbally or in writing, although specific formalities may be imposed at law for “*publicity or evidentiary purposes.*”¹³⁴

In smart contracts, consent is generally implied through performance through the use of cryptographic keys.¹³⁵ “*Due to the unique nature of such (cryptographic) keys, it can be argued that they provide a function equivalent to a digital signature of the contracting party and in principle should be accepted as evidence of identification and consent by electronic means, at least with reference to the electronic wallet or tokens to which it refers.*”¹³⁶ “*The fact that the parties submit their cryptographic private keys to commit their resources to the smart contract is proof of such an intent.*”¹³⁷

The use of cryptographic keys does not provide unequivocal proof of valid consent as these may be transferred to third parties, may be lost or used in error or due to violence or fraud and in terms of the Civil Code “*where consent has been given by error, or extorted by violence or procured by fraud, it shall not be valid.*”¹³⁸

The introduction of an explicit process to signify consent in smart contracts is therefore advisable: “*something like clicking an “I agree” button before launching.*”¹³⁹ This is similar to consent in the electronic procurement of goods and services which is regulated by the Electronic Commerce Act¹⁴⁰ and the eIDAS Regulation¹⁴¹ which, with its direct effect, aims to “*bring uniformity inter alia in the area of electronic records and signatures, and in some cases also to bring equivalence to handwritten signatures.*”¹⁴²

¹³¹ Lawrence Lessig, *Code and Other Laws of Cyberspace* (Basic Books, 1999).

¹³² V. Caruana Galizia, *Notes on Civil Law*, Laws III Year, revised by J. M. Ganado (Old University 1978) 260.

¹³³ Ganado (n 100) 117.

¹³⁴ Tanti and Ganado (n 92) 243.

¹³⁵ Durovic and Janssen (n 66) 68.

¹³⁶ Tanti and Ganado (n 92) 244.

¹³⁷ Werbach and Cornell (n 72) 326.

¹³⁸ Art. 974, Civil Code.

¹³⁹ Durovic and Janssen (n 66) 72.

¹⁴⁰ In terms of Art. 9(2) of the Electronic Commerce Act: *for the purpose of any law relating to contracts, an offer, an acceptance of an offer and any related communication, including any subsequent amendment, cancellation or revocation of the offer, the acceptance of the contract may, unless otherwise agreed by the contracting parties, be communicated by means of electronic communications.*

¹⁴¹ Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC.

¹⁴² Tanti and Ganado (n 92) 233.

Acceptance in smart contracts may also be inferred through the transfer of cryptocurrency from one person to another.¹⁴³ Some argue that in smart contracts it is *performance* (using cryptographic keys and the transfer of cryptocurrency) which signifies consent¹⁴⁴ rather than the agreement itself. We find this presumption even in Civil Law where the performance of an act freely carried out will be evidence of an existing agreement to act in a particular context, for example, the advancement of money and the repayment in installments indicate a loan and not a donation.

Durovic and Janssen adopt this same reasoning when considering the initial stages of any agreement: *offer and acceptance*.¹⁴⁵ They conclude that “*the rules on offer and acceptance will in principle not pose an obstacle to smart contracts’ recognition as legally binding.*”¹⁴⁶ An offer is generally implied through performance: the posting of an app or another digital facility which may include a smart contract in its operations would constitute an offer which may be accepted through subscription (the acceptance of the terms and conditions and the use of the processes to take advantage of the facility).

The use of cryptographic private keys to commit resources to the smart contract is “*proof of a commitment.*”¹⁴⁷ One party posts the contract on a blockchain (the offer) which is then capable of being accepted by the cryptographic key of the other party (the offeree). Acceptance may also take place through the transfer of an asset, such as cryptocurrency. Uploading the asset to the smart contract “*provides an unequivocal communication of acceptance.*”¹⁴⁸ Therefore, in a crowdfunding scenario, the terms are predefined by the beneficiary. Any person who wishes to donate to the project transfers assets to the pool thereby accepting the offer through performance.¹⁴⁹ There is automatic execution in a smart contract: when a person uploads assets to the smart contract, an offer is being made and accepted and the smart contract is executed. In terms of the Theory of Information, a contract is concluded where there is knowledge of the acceptance of the offer by the offeror. The Electronic Commerce Act goes a step further - an electronic contract is concluded when the person who accepts the offer receives acknowledgment of receipt of acceptance. The Theory of Information does not seem to be applicable in the case of smart contracts as, as soon as the offer is accepted, the contract is performed. The Theory of Declaration seems more suitable in this case. This states that the contract is concluded once the offeree’s acceptance becomes manifest, irrespective of whether the offeror is aware of such acceptance.

The parties’ intent is “*manifested in code.*”¹⁵⁰ This should not pose a problem if both parties read and understand code and this can be verified by an adjudicator.¹⁵¹ If the smart contract executes in a manner which is different to what the parties intended, this may be

¹⁴³ Catchlove (n 72).

¹⁴⁴ Rosario Girasa, *Regulation of Cryptocurrencies and Blockchain Technologies* (Cham, Switzerland: Springer International Publishing, 2018) 64.

¹⁴⁵ Raskin (n 12) 322.

¹⁴⁶ Durovic and Janssen (n 66) 67.

¹⁴⁷ Werbach and Cornell (n 72) 368.

¹⁴⁸ Catchlove (n 72) 11.

¹⁴⁹ Savelyev (n 13) 116.

¹⁵⁰ Blake (n 119) 28.

¹⁵¹ Durovic and Janssen (n 66) 68.

considered an error, one of the defects of consent, and any one of the contracting parties may attempt to annul the contract. The error, however, must be substantial, determining and inexcusable and must concern an essential feature of the contract. Courts are generally averse to such claims and therefore a heavy onus of proof is required.¹⁵²

Legislative intervention will be necessary to determine what evidence will be necessary to support a claim that a smart contract has been validly entered into and to establish whether cryptographic keys are equivalent to signatures. A practical solution would be to require fingerprints together with the use of cryptographic keys, and this for identification purposes.¹⁵³

3.2.3 *A Certain Thing Which Constitutes the Subject-Matter of The Contract;*

*Every contract has for its subject-matter a thing which one of the contracting parties binds himself to give, or to do, or not to do.*¹⁵⁴ The subject matter may not consist of things which are impossible, prohibited by law, immoral, contrary to public policy¹⁵⁵ or *extra commercium*.¹⁵⁶ Different provisions of law apply depending on the subject matter of a contract and how this is classified: whether a movable (tangible, intangible or fungible) or an immovable (whether by nature or by operation of the law). No issues arise if digital assets represent traditional assets as these may be categorised in the same manner as the underlying assets.¹⁵⁷

The VFA Act defines a DLT asset as “(a) a virtual token; (b) a virtual financial asset; (c) electronic money; or (d) a financial instrument, that is intrinsically dependent on, or utilises, Distributed Ledger Technology.”¹⁵⁸ To ensure certainty, the MFSA designed a Financial Instrument Test which consists of a number of questions intended to guide a market player to reach a determination as to the nature of the DLT asset and, consequently, the applicable regulatory framework.¹⁵⁹

Certainty of subject matter also means that the parties understand the agreement, which may be problematic if the smart contract is expressed solely in code. It is therefore proposed that the smart contract is accompanied by a natural language contract – or a summary or description of key elements - to ensure that all parties understand the terms and conditions of the agreement. In terms of the ITAS Act, for an innovative technology arrangement to be certified in Malta “*the specific purposes, qualities, features, attributes, limitations, conditions, terms of service and behaviours or aspects of the relevant innovative technology arrangements and on the basis of which a user is invited to participate in, rely on or use the innovative technology arrangement*”¹⁶⁰ must be stated in English. In case of

¹⁵² Ganado (n 100) 121. Giuseppe Schembri et v Leonardo Azzopardi et, First Hall Civil Court, 9th February 1965; Director of Agriculture and Fisheries v Calcedonio Carabott, Commercial Court, 11th March 1994.

¹⁵³ *ibid* 246.

¹⁵⁴ Art. 982(1), Civil Code.

¹⁵⁵ Art. 985, Civil Code.

¹⁵⁶ Art. 982(2), Civil Code.

¹⁵⁷ EU Blockchain Observatory & Forum <https://www.eublockchainforum.eu>

¹⁵⁸ Art. 2(2), VFA Act.

¹⁵⁹ Tanti and Ganado (n 92) 169.

¹⁶⁰ Art. 8(4)(e), ITAS Act Art.

conflict between the English version and the code, the English language version prevails.¹⁶¹ This ensures that each party has equal bargaining power and has adequate knowledge of what he is binding himself to. The difficulty is how to make a written term prevail over a coded term which will self-execute once deployed. It is post-fact that a remedy can be applied and that is always more complex as pre-fact it is easier to stop execution of the code by court orders or personal intervention. Online service providers often use pop-up screens or click wrap agreements which users must accept to obtain the services they require.¹⁶²

Another solution could be to enter into hybrid contracts: the terms of the agreement are expressed in natural language and it is only the performance – or aspects of it - which are expressed in code, such as the execution of payment or the release of an asset through a credit and debit system. This context is limited by the difficulty posed by physical assets. The solution in relation to securities, which were traditionally physical and were then converted into digital representations, was the creation and imposition of regulated custodians which would hold the physical assets represented by the digital instruments. This gave security in transactions as the parties were given assurance that when they dealt in the digital asset, the custodian would simultaneously carry out or record the transaction in relation to the physical asset. This does not appear to have developed yet in relation to smart contracts although some developments have taken place in relation to stable coins which are connected to real currencies.

3.2.4 A Lawful Consideration

This is the “*immediate and direct scope*” intended by the parties.¹⁶³ An obligation which does not have a consideration (*‘causa’*), or which is based on a consideration which is *unlawful or false* does not have any effect.¹⁶⁴ However, if it is proved that an agreement was founded on a sufficient consideration, the contract is valid even though this was not stated.¹⁶⁵ The consideration must not be prohibited by law or contrary to public policy or morality.¹⁶⁶

Any transfer of assets will only be valid if the consideration of the smart contract is valid too. The smart contract follows on the consideration of the main contract of which it forms part and if the main contract is valid and contemplates a payment for valid consideration, then the performance of that payment may not be attacked because it is done on the basis of a valid consideration. It is important that it be so, otherwise every payment under a smart contract would be considered a payment without a valid legal basis resulting in the possibility of the payment being reclaimed by the payor. This would certainly not help create certainty in the performance of contracts involving smart contracts. Nobody ever queried the payment of a standing order through a bank because it is done electronically and automated through the trigger of a payment date. It should be no different if a smart

¹⁶¹ Art. 8(4)(e), ITAS Act Art.

¹⁶² Sylvia Kierkegaard, ‘E-Contract Formation: U.S. and E.U. Perspectives’ (2007) 3 *Shidler J. L. Com. & Tech.* 312.

¹⁶³ Professor V. Caruana Galizia (n 132) 281.

¹⁶⁴ Art. 987, Civil Code.

¹⁶⁵ Art. 988, Civil Code.

¹⁶⁶ Art. 990 Civil Code.

contract is used for the same purpose. Nonetheless, an interface between the legal contract and the smart contract, or a specification in the legal contract that the lawful consideration is the asset managed by the smart contract, is necessary to ensure the link between the legal contract and smart contract in so far as consideration is concerned.

Unfortunately, the decentralised and immutable nature of these smart contracts renders them attractive to persons who wish to engage in illegal activities such as the sale of drugs or illegal gambling as criminals do not have recourse to the Courts in case of deceit or fraud.¹⁶⁷ They therefore rely on this technology which is virtually irreversible to enter into arrangements which may not be stopped. Moreover, a decentralised marketplace operates without centralised control, thus facilitating illegal activity due to lack of monitoring and supervision which is expected from most operators under the prevention of money-laundering laws.....; *“parties may rely on lex cryptographica to make it increasingly difficult for governments and public authorities to intervene and repress criminal conduct, encouraging black markets, gambling, and unlawful activities, including criminal acts coordinated by untrusted parties.”*¹⁶⁸

3.3 Form

Another important aspect which must be considered is *form*. While it is always beneficial for agreements to be put into writing for evidentiary purposes, in some cases a public deed or a private writing are necessary on pain of nullity.¹⁶⁹ Will computer code qualify as ‘writing’? In the case of electronic contracts, the Electronic Commerce Act¹⁷⁰ does stipulate that a contract *“shall not be denied legal effect, validity or enforceability solely on the grounds that it is wholly or partly in electronic form or has been entered into wholly or partly by way of electronic communications or otherwise.”*¹⁷¹

A first step would be to ensure that (a) code would fall under the definition of “electronic contract” in terms of the Electronic Commerce Act: *“a contract concluded wholly or partly by electronic communications or wholly or partly in an electronic form”*¹⁷²; and (b) to widen the definition of “writing” in the Interpretation Act¹⁷³ that is *“printing, lithography, typewriting, photography and any other mode of representing or reproducing words in a visible form”*¹⁷⁴ so that this includes code.

Unless the law is amended, smart contracts will not satisfy the requisites for the execution of a valid public deed as this must be read in the presence of all the parties and then signed by them and by the Notary Public who attributes public faith thereto. In the case of private writings, it will be up to the legislator or the Court to decide whether the requisite of ‘form’

¹⁶⁷ De Filippi and Wright (n 6) 87.

¹⁶⁸ *ibid* 88.

¹⁶⁹ Art. 1322, Civil Code.

¹⁷⁰ Cap. 426, Laws of Malta.

¹⁷¹ Art 9(1), Electronic Commerce Act.

¹⁷² Art. 2, Electronic Commerce Act.

¹⁷³ Cap. 249, Laws of Malta.

¹⁷⁴ Art 2(1), Interpretation Act.

will be satisfied solely through code, as this may not be a recognised language, or whether a natural language contract will also have to be completed to ensure clarity. Furthermore, it may be a challenge to ensure the confidentiality of a smart contract on a public open DLT. In this case, the parties may wish to formalise their agreement using the best combination of traditional legal contract and smart contract that can ensure the required level of confidentiality.

Cryptographic keys may be considered equivalent to signatures and indicative of the user's consent. They do not provide any guarantee of the user's identity, however. They are merely indicative of the consent of the person who has access to such key. Such certainty may be provided by a trusted intermediary (as is the case with qualified electronic signatures which are considered as having "*equivalent legal effect of a handwritten signature*"¹⁷⁵ and which are approved by a Trust Service Provider¹⁷⁶). Requiring such certainty would be costly and time consuming due to the number of keys which will have to be verified. A solution to prove the user's identification could be to include the requirement of a fingerprint.¹⁷⁷ Alternatively, cryptographic keys may be treated as bearer instruments wherein the user is considered the owner thereof.¹⁷⁸ However, there is a very strong momentum to ban bearer instruments from a money laundering control perspective – so this conflicts with existing policies already in place.

3.4. Conclusion

While smart contracts will "*bring clarity, predictability, auditability and ease of enforcement to contractual relations*",¹⁷⁹ it is unlikely that they will ever fully replace traditional contracts.¹⁸⁰ Smart contracts will only constitute a valid contract in terms of the Civil Code if the conditions established therein are complied with. Without legislative intervention, a contracting party will never be certain of the validity of a smart contract he enters into. Therefore, regulation is essential to ensure certainty and ultimately the preservation of the rule of law.

¹⁷⁵ Art. 25(2) eIDAS Regulation.

¹⁷⁶ Tanti and Ganado (n 92) 246.

¹⁷⁷ *ibid.*

¹⁷⁸ *ibid.*

¹⁷⁹ J. Dax Hansen, Laurie Rosini, Carla L. Reyes, *More Legal Aspects of Smart Contract Applications* (White Paper, Perkins Coie LLP, 2018) 4.

¹⁸⁰ Josh Stark, 'How close are smart contracts to impacting real-world law?' (Coindesk, April 11 2016) <<https://www.coindesk.com/blockchain-smarts-contracts-real-world-law>>.

CHAPTER 4: SMART CONTRACTS - AN ANALYSIS OF THEIR EFFECTS AND ENFORCEMENT

4.1 Introduction

Nick Szabo in his 1996 paper entitled “*Smart Contracts: Building Blocks for Digital Markets*”¹⁸¹ identified four main objectives for contract design - observability, verifiability, privity and enforceability:

- (a) *observability* (the contracting parties may observe the manner in which the contract is being performed);
- (b) *verifiability* (performance or otherwise of contractual obligations may be *verified* by the contracting parties);
- (c) *privity* (the contents of a contract are only known to the extent that this is necessary for its performance); and
- (d) *enforceability* (the contract may be enforced in a Court of law).

Szabo believed that these objectives could be reached through smart contracts as these allow parties to *observe* performance and *verify* the self-execution of the contract once pre-determined standards are met. The self-executing nature of smart contracts reduces or eliminates time spent on monitoring the performance of obligations and, consequently, their enforcement.¹⁸² Indeed, “*smart contracts may be smarter than paper contracts because they automatically can execute certain pre-programmed steps.*”¹⁸³ They are currently best suited for ensuring that funds are paid upon the triggering of certain events and for the imposition of financial penalties if conditions are not satisfied.

4.2 Understanding the main effects: Immutability and Self-Enforcement

Permissionless DLT smart contracts come with two attributes that are crucial requirements if they are to take on the performance of obligations with lower cost, and greater efficiency, relative to traditional contracts. These are *immutability* and *self-enforcement*. While perhaps not as truly immutable as is widely believed, since it is possible, with majority consensus, to effect change even on a permissionless DLT, in general, a smart contract, once triggered, changes the state of its blockchain immutably. Self-enforcement is a consequence of automatic execution. Once the conditions specified in the code are met, the smart contract executes automatically, enforcing the performance of obligations.

¹⁸¹ Szabo, ‘Smart Contracts: Building Blocks for Digital Markets’ (n 31).

¹⁸² Blake (n 119) 63.

¹⁸³ Levi and Lipton (n 39).

4.2.1 Immutability

Traditional contracts may be amended with the mutual consent of the parties thereto rendering them somewhat flexible. A smart contract is immutable and unmodifiable as its code is seeded into a blockchain across multiple nodes. This means smart contracts are “*technically binding for all the parties.*”¹⁸⁴

This is beneficial for several reasons: (a) the contract may not be breached to the detriment of a weaker counterparty; (b) it may operate without expensive intermediaries even though information from oracles may be necessary; and (c) smart contracts “*grant contracting parties new tools to reduce monitoring costs*”¹⁸⁵ due to the distributed nature of the underlying blockchain network, its tamper-resistant qualities and the automatic execution of the code.

Smart contracts, therefore, provide certainty that the transaction will take place, and this is in line with the principle of *pacta sunt servanda*. Moreover, even though smart contracts appear to be inflexible, they may be more dynamic than their traditional counterparts as they may be programmed in a manner which allows their performance to vary depending on information provided by oracles. “*With oracles, smart contracts can respond to changing conditions in near real time.*”¹⁸⁶ Oracles are the link between the digital world and the outside world – through their input they determine how the smart contract will execute, confirming or otherwise whether terms and conditions have been met.¹⁸⁷ This, in turn, affects how the smart contract operates.¹⁸⁸

However, their immutable nature also means that smart contracts must be carefully defined. Contracts are “*a collection of negotiating points relating to a particular agreement between the parties, stated in language that parties can refer to and at least in theory understand.*”¹⁸⁹ They have the force of law between the contracting parties¹⁹⁰ and “*must be carried out in good faith.*”¹⁹¹ They are interpreted according to the intention of the parties and there is no room for interpretation where the terms of an agreement are clear.¹⁹²

Where the meaning of an agreement differs from the common intention of the parties, preference is given to their intention.¹⁹³ If any terms in the agreement are ambiguous, these are interpreted according to usage,¹⁹⁴ and customary clauses are deemed to be included in a contract, even though they are not expressed.¹⁹⁵ Moreover, even though the contract may

¹⁸⁴ Savelyev (n 13) 15.

¹⁸⁵ De Filippi and Wright (n 6) 80.

¹⁸⁶ *ibid* 75.

¹⁸⁷ Gigi Gatt, *Do the Existing Laws cover Smart Contract or do we need a new set of laws to deal with them?* (LL.B., University of Malta, 2019) 81.

¹⁸⁸ Mik, ‘Smart Contracts: Terminology, Technical Limitations and Real World Complexity’ (n 60) 296.

¹⁸⁹ Lim, Saw, Sargeant (n 103).

¹⁹⁰ Art. 992, Civil Code.

¹⁹¹ Art. 993, Civil Code.

¹⁹² Art. 1002, Civil Code.

¹⁹³ Art. 1003, Civil Code.

¹⁹⁴ Art. 1006, Civil Code.

¹⁹⁵ Art. 1007, Civil Code.

be worded in general terms, it only extends to those things which the parties appear to have intended to deal with.¹⁹⁶

A smart contract is programmed to reach a pre-defined outcome - when its conditions are triggered, the agreement is performed, the outcome being determined by the code itself. Computer language eliminates misunderstandings found in natural language.¹⁹⁷ *Smart contracts rely on precisely coded terms aimed at excluding ambiguity and insulated from the contextual facts of the physical world.*¹⁹⁸ There is no space for ambiguity in smart contracts as these may only be modified if this is contemplated by the code. Indeed, even though they are touted as reducing costs, they may be more expensive than their traditional counterparts due to the precision required to *“define all future states of the contract.”*¹⁹⁹ Moreover, it may not be possible to include all the obligations entered by the parties into computer code. They are effective mainly when conditions consist of if-then clauses which do not require human intervention, and which are not subjective. Limitations arise, however, when assessment is required.

Indeed, traditional contracts may include obligations, such as “reasonableness” or “appropriateness”, which may not be converted into code. In this regard, traditional contracts are more flexible allowing parties to use *“performance standards, generally-defined contract terms, to create an enforceable agreement without requiring complete knowledge of what might happen in the future.”*²⁰⁰ Once the agreement is signed, the contract is somewhat flexible due to:

(a) *Linguistic ambiguity*: *“parties can never reduce the universe of their agreement to fully-defined terms ex ante.”*²⁰¹ Therefore standard terms are generally included in agreements, avoiding the need for lengthy negotiation. The parties may modify the original agreement or, if this is too time consuming, may reach a verbal agreement (although it is always advisable to formalise an agreement in writing);

(b) *Enforcement discretion* allowing parties to selectively enforce breaches to maintain the contractual relationship or to voluntarily agree to new obligations. Smart contracts do not allow such discretion similarly to what we find with security agreements where there is little or no flexibility in the case of a breach.

Perhaps the best solution is to *“blend natural language contracts with smart contracts written in code.”*²⁰² *“Using a hybrid could create a complementary relationship.”*²⁰³ The legal

¹⁹⁶ Art. 1010, Civil Code.

¹⁹⁷ Michel Cannarsa, ‘Contract Interpretation’ in Larry A. DiMatteo, Michel Cannarsa and Cristina Poncibò (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2020) 112.

¹⁹⁸ *ibid* 110.

¹⁹⁹ Jeremy M. Sklaroff, *Smart Contracts and the Cost of Inflexibility* (2017) 166 U. PA. L. REV. 263, 277 Available at: https://scholarship.law.upenn.edu/penn_law_review/vol166/iss1/5.

²⁰⁰ *ibid*.

²⁰¹ *ibid* 279.

²⁰² De Filippi and Wright (n 6) 78.

²⁰³ Werbach and Cornell (n 72) 318.

obligations could be found in the traditional contract, but the execution thereof would take place through the smart contract.

Irrevocability is not alien to the Maltese Civil Code which provides for the *irrevocable* mandate by way of security. A mandate may be revoked by the mandator at any time unless it is expressly stated in writing to be granted by way of security in favour of the mandatary or of any other person, and that it is irrevocable.²⁰⁴ In this case, such mandate may only be revoked with the consent of the person whose interest it secures. Such irrevocable mandate is not terminated upon a declaration of bankruptcy. This is a “*self-help remedy* (in favour of secured creditors) *in the event of a default under the financing arrangement.*”²⁰⁵ “Self-help” is often mentioned in the case of smart contracts due to their self-enforcing nature.

4.2.2 Self-Enforcement

One of the attributes of a smart contract is self-execution, the attribute of automatically changing the state on the blockchain in accordance with its code once the conditions for its execution are met. The consequence of self-execution is self-enforcement, that is the automatic performance of obligations enforced by the smart contract itself. In terms of the definition of “smart contract” in the MDIA Act and the VFA Act, a smart contract may be “*enforceable by execution of computer code ... and which may be also enforceable by ordinary legal methods or by a mixture of both.*”²⁰⁶

Traditional contracts, even though binding between the parties, are voluntarily performed and, in case of default, may be enforced by the Court. Smart contracts remove this voluntary element and may become a new method of ensuring the performance of some types of obligations, and therefore an alternative to the imposition of penalties, suretyship or other traditional methods of guarantee. “*Smart contracts can be a useable tool to effectively counteract consumers’ inertia in triggering and enforcing their rights, which are standardized and easily verifiable.*”²⁰⁷ Their self-enforcing nature potentially removes the need for Courts “*to intervene and enforce its terms.*”²⁰⁸

This is too positive a view, however, as laws may change or events may occur due to which the parties to the smart contract may decide that this is to operate differently or not at all. Moreover, the smart contract may contain errors or gaps due to situations which were not anticipated by the contracting parties or it may operate differently than originally intended by them. A default remedy to the Courts is therefore required even though smart contracts operate without any reference to a legal framework which does not mean, however, that the law does not apply to them. “*Smart contracts are not truly enforceable without contract*

²⁰⁴ Article 1887(1) of the Civil Code.

²⁰⁵ Nicolai Vella Falzon and Peter Grima, Fenech & Fenech Advocates, *Security and quasi-security vehicles for lenders in Malta: an increasingly creditor-friendly jurisdiction*, Practical Law, Available at: [https://uk.practicallaw.thomsonreuters.com/7-562-4947?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/7-562-4947?transitionType=Default&contextData=(sc.Default)&firstPage=true)

²⁰⁶ Definition of “smart contract” in the MDIA Act and in the VFA Act.

²⁰⁷ DiMatteo, Cannarsa and Poncibò (n 1) 16.

²⁰⁸ Tanti and Ganado (n 92) 251.

*law. The smartness of a contract may make it initially self-performing, but it is ultimately left to the courts to determine whether that performance should stand.”*²⁰⁹

This is contested by the proponents of the “*code is law theory*” who state that the parties opted to use a smart contract and therefore had “*the intention to use an alternative regulatory system and not traditional contract law.*”²¹⁰ This argument is weak. If a smart contract is programmed to carry out an illegal activity, this continues to be illegal irrespective of the fact that it is written in code. “*Code is not law.*”²¹¹ In reality, the parties chose a self-enforcing mechanism and did not anticipate requiring recourse to the Court. This does not mean, however, that they do not wish that such contracts are upheld by a court of law.²¹² Indeed, Courts retain jurisdiction over smart contracts and will interpret them based on the principles of contract law, calling in witnesses and reviewing documentary evidence to provide a determination on the contract and provide an appropriate remedy. It is important to note, however, that it will probably be difficult for the Courts to interpret programming language and they will probably require the assistance of technical experts.

What is certain is that “*the nature of the application of contract law rules will need to be adapted since the automated, self-performing nature of smart contracts shifts perspective from ex post assessment to ex ante programming.*”²¹³ In traditional contracts, recourse to the Court is made after the contract is concluded between the parties. A solution is sought *ex post*. In the case of smart contracts, the Court no longer enforces but rather provides a remedy after the code has been executed. Recourse to the Court is made for *reversion or restitution* as the smart contract would already have been executed.²¹⁴ “*Maybe contract law ... will need to develop rules to retroactively deal with technically non-conforming performance. This type of structure is already in place through the retroactive nature of contract interpretation and through the application of contract law’s policing doctrines – duress or coercion, mistake, misrepresentation, and unconscionability or hardship.*”²¹⁵

Such recourse to the Court is important as the self-executing nature of smart contracts may give rise to implications of self-help which is prohibited in some legal systems. This is the process of obtaining redress without recourse to the Court and is prohibited due to principles of public order and social tranquility which are to be ensured by public authorities. However, does the self-executing nature of smart contracts amount to self-help?

Two examples of self-help found in Maltese law are: *spoliation* (regulated by the Civil Code) and *ragion fattasi* (regulated by the Criminal Code²¹⁶):

²⁰⁹ DiMatteo, Cannarsa and Poncibò (n 1) 11.

²¹⁰ Durovic and Janssen (n 66) 76.

²¹¹ Tanti and Ganado (n 92) 251.

²¹² Durovic and Janssen (n 66) 71.

²¹³ DiMatteo, Cannarsa and Poncibò (n 1) 12.

²¹⁴ Durovic and Janssen (n 66) 76.

²¹⁵ DiMatteo, Cannarsa and Poncibò (n 1) 11.

²¹⁶ Cap. 9, Laws of Malta.

- (a) Self-help²¹⁷ generally includes an element of violence or clandestinity. Indeed, Caruana Galizia defines spoliation²¹⁸ as “a person is deprived of his possession or detention through violent or clandestine spoliation.”²¹⁹ Three elements must exist for the action of spoliation²²⁰ to succeed: (a) possession, (b) the act of spoliation which had to be done secretly or against the consent of the applicants, and (c) the legal action had to be filed within two months from the act of spoliation. In Margherita Fenech vs Paula Zammit,²²¹ the Court held: *L-actio spolii hija pjuttost fuq l-esiġenzi ta' utilità soċjali milli fuq il-principju assolut ta' ġustizzja, hija eminentement intiża l-protezzjoni ta' kwalunkwe pussess, u jiġi impedut liċ-ċittadin privat li jieħu l-liġi f'idejh; b'mod li l-fini tagħha huwa dak li jiġi restawrat l-istat tal-pussess li jkun ġie skonvolt jew turbat.*

Also, in Vincenzina Cassar et vs Annetto Xuereb Montebello,²²² the Court held: *"il-ġurisprudenza tat-Tribunali tagħna dejjem kienet konstanti fl-interpretazzjoni ta' dawn il-liġijiet fis-sens li l-azzjoni ta' spoll hija 'di ordine pubblico', unikament u esklussivament intiża biex timpedixxi li wieħed jagħmel ġustizzja b'idejh mingħajr l-intervent tat-tribunal civili u tipprevjeni l-konsegwenzi deplorevoli ta' aġir simili."*

There is no violence or clandestinity in the case of smart contracts – the contracting party to a smart contract is aware that his property will be paid out or transferred to the other contracting party in certain instances - he agreed to this method of enforcement when entering into the smart contract. Therefore, reversion does not take place “secretly or against the consent of the applicant.”

- (b) *Ragion fattasi*²²³ is a crime against the unlawful assumption of powers belonging to the public authority, that is, the arbitrary exercise of pretended rights. It is regulated by article 85(1) of the Criminal Code:

Whosoever, without intent to steal or to cause any wrongful damage, but only in the exercise of a pretended right, shall, of his own authority, compel another person to pay a debt, or to fulfil any obligation whatsoever, or shall disturb the possession of anything enjoyed by another person, or demolish buildings, or divert or take possession of any water-course, or in any other manner unlawfully interfere with the property of another person, shall, on conviction, be liable to imprisonment for a term from one to three months: Provided that the court may, at its discretion, in lieu of the above punishment, award a fine (multa).

²¹⁷ Gatt (n 187) 81.

²¹⁸ Art. 535, Civil Code.

²¹⁹ Caruana Galizia (n 132) 130-133.

²²⁰ Art. 535, Civil Code.

²²¹ First Hall, Civil Court, 12th April 1958.

²²² Court of Appeal (Civil, Superior) 28th May 1956.

²²³ Gatt (n 187) 50.

Carrara defines *ragion fattasi* as: *il delitto di chiunque credendo di aver un diritto sopra cosa nell'altrui possesso, o sopra altro individuo lo esercita malgrado la opposizione vera o presunta di questo, per fine di sostituire la sua forza privata all'autorità pubblica, senza per altro eccedere in violazioni speciali di altri diritti.*²²⁴

Four elements must subsist for this crime to be proved:

- (a) there must be an external act which deprived an individual of the property he used to enjoy;
- (b) the perpetrator must believe that he is exercising his right;
- (c) the perpetrator knew that he was taking the law into his own hands; and
- (d) there was no title in favour of the perpetrator.²²⁵

Professor Sir Anthony J. Mamo held that: *These crimes attack the State but indirectly, inasmuch as, without being actuated by motives hostile to the Government, they proceed from other causes, often of a private character and affect those social institutions on and by which the machinery of the Government rests and moves: those institutions, that is to say, which provide the means of guaranteeing to every member of the community the integrity of his rights and those benefits which derive from the state of civil society.*²²⁶

There is no *ragion fattasi* in the case of smart contracts. These operate in accordance with the code programmed between the parties, or when they are already embedded in an offer by one party, on being accepted through subscription by the other party. There is no arbitrary exercise of pretended rights by one party against the other. There is no unlawful assumption of powers. The parties themselves agreed that the code was to execute in such a manner in the case of default of obligations by one of the parties. Therefore, one party does not, through his own authority, compel another person to pay a debt, or to fulfil any obligation and does not unlawfully interfere with the property of another person. Smart contracts merely operate in the manner they are programmed upon the triggering of certain events.

At most, what we might have here is an obstacle to have an independent tribunal determine one's rights in case of a dispute as this method avoids that scenario through its design. This is not a contract argument but a constitutional one, however, which goes beyond the scope of this dissertation.

4.3 The Rescission, Rectification and Variation of Smart Contracts

The performance of smart contracts may not be stopped by the parties, by a central authority or by the Court, unless the code so permits. They are inflexible and are not

²²⁴ Carrara, *Programma del Corso di Diritto Criminale, Volume V- Parte Speciale* (7th edn Libreria Fratelli Cammelli Editori, Prato 1899) 535.

²²⁵ Renata Formosa, *The Offence of Ragion Fattasi* (LL.D. Thesis, University of Malta, 2011), 49.

²²⁶ Professor Sir A. J. Mamo, *Notes on Criminal Law, Volume II* (Għsl Publications) 30.

affected by any change in the circumstances or the intent of the parties.²²⁷ Any rescission, rectification or variation is, in principle, impossible²²⁸ unless smart contracts are programmed to seek input from oracles or further execution at certain predefined events.²²⁹ Indeed, a provision for the modification of the smart contract may be programmed into the code but this lessens the certainty gained using smart contracts.²³⁰

It is feasible to have a trusted third party being given the power to intervene and modify a smart contract (or its terms and conditions) if both parties agree. It might be critical to cater for such powers of intervention and modification if one is to avoid certain unexpected and very damaging outcomes due to coding deficiencies in the smart contract which could arise unexpectedly. The parties may plan for external circumstances through the input of oracles who can adjust and update contractual obligations. *“The possibilities for oracles are manifold and can range from human-based oracles to certain digitally verifiable events, such as current stock prices, to an AI algorithm.”*²³¹

It is interesting to note that the ITAS Act²³² makes it a condition for certification of the code of smart contracts, forming part of an innovative technology arrangement, to allow for intervention to address serious defects which cause losses or breaches of law. Maltese law caters for a default technical administrator, who is registered with the MDIA, to have these powers should the arrangement not intervene through its own structures. A simple example reflecting these possibilities is a smart contract, the code of which keeps repeating a payment after the first payment fully meets the debt obligation of a party to it.

Another solution would be for all smart contracts to have clauses providing for the incorporation of Court decisions into contracts. This will be beneficial, but it will run counter to the principles of certainty and immutability characterizing smart contracts.

4.3.1 The Rescission of Smart Contracts

Contracts have the force of law between the contracting parties and may only be revoked with their mutual consent, or on grounds allowed by law.²³³ When a contract is rescinded, the parties are restored to the condition they were prior to the contract being concluded²³⁴ and each party must restore anything he received by virtue of the contract.²³⁵ It even operates against third parties in possession.²³⁶

Rescission may be sought when an agreement (a) is defective due to the absence of an essential element necessary for the validity of any contract; or (b) is expressly declared to be

²²⁷ Durovic and Janssen (n 66) 73.

²²⁸ *ibid.*

²²⁹ *ibid* 74.

²³⁰ *ibid* 75.

²³¹ Woebbeking (n 3) para 1.

²³² Art. 8, ITAS Act.

²³³ Art. 992, Civil Code.

²³⁴ Art. 1209, Civil Code.

²³⁵ Art. 1209(2), Civil Code.

²³⁶ Art. 1210(1), Civil Code.

null at law²³⁷ or (c) is entered into by a minor who may request the rescission of the contract on the ground of lesion²³⁸ unless this is fortuitous and unforeseen²³⁹ or expressly prohibited by law. Indeed, this right of withdrawal is essential in certain instances such as business-to-consumer contracts where the consumers are considered the weaker party (such as in the case of cold calling or distance selling).

The Court may decide that the smart contract is null *ab initio*, the consequence of which will be the reversion of the transaction to the *status quo ante*. *The aim of this remedy is to put the injured party in the position that he/she would have been had the contract not been entered into.*²⁴⁰ This is problematic in a blockchain scenario wherein information may not be removed from the blockchain. Moreover, any changes must be approved by every participant in the network, hardly an effective remedy for the injured party. The smart contract may include code allowing it to be terminated or amended in certain cases,²⁴¹ however the history of the transaction will remain recorded on the global register.²⁴² *“There is a problem when a court voids a smart contract, but the performance of the contract, such as transferring of title, remains in existence on the blockchain due to its immutability.”*²⁴³

Reverse transactions may be programmed in the code: the original transaction remains unchanged, but the program allows for a second inverse transaction which *“will have the effect of negating the original one.”*²⁴⁴ This is, however, a reverse transaction which is not equivalent to a transaction being declared null *ab initio*, that is, one which is considered as if it never took place. In the case of smart contracts, the transaction history will remain permanently documented on the blockchain which may give rise to problems, perhaps not in the case of Civil Law but certainly with regards to some rights which may be exercised under Data Protection Law, such as the right to be forgotten.²⁴⁵

The self-executing nature of smart contracts may deprive the parties of rights granted to them by the Civil Code. This occurs, for example, in the case of resolutive conditions. In terms of Article 1066(1), Civil Code: *“A resolutive condition is that which, on being accomplished, operates the dissolution of the obligation, and replaces things in the same state as though the obligation had never been contracted.”* It is *“in all cases implied in bilateral agreements in the event of one of the contracting parties failing to fulfill his engagement.”*²⁴⁶ In the case of default, the agreement is not dissolved *ipso iure* and it is lawful for the Court, according to circumstances, to grant a reasonable time to the defendant to fulfill his obligations:²⁴⁷

²³⁷ Art. 1212, Civil Code.

²³⁸ Art. 1213, Civil Code.

²³⁹ Art. 1214, Civil Code.

²⁴⁰ Tanti and Ganado (n 92) 253.

²⁴¹ Durovic and Janssen (n 66) 76.

²⁴² Woebbeking (n 3) para 1.

²⁴³ DiMatteo, Cannarsa and Poncibò (n 1) 12.

²⁴⁴ Tanti and Ganado (n 92) 254.

²⁴⁵ Woebbeking (n 3) para 1.

²⁴⁶ Art. 1068, Civil Code.

²⁴⁷ Art. 1068, Civil Code.

“Huwa veru li l-patt ta’citu kommissorju ... huwa sottointiż f’kull kuntratt bilaterali ... Però f’dan il-każ il-kuntratt ma jinħallx ipso iure, u l-Qorti tista’ tagħti żmien lill-parti inadempjenti biex tesegwixxi l-obbligazzjoni tiegħu. Għalhekk, il-konvenut ma jistax marte proprio jwaqqa’ l-kuntratt, imma se mai dan jinħall b’ministeru tal-Qorti fuq talba tal-parti ...”²⁴⁸

This is not possible in the case of smart contracts which execute automatically in terms of the code. The contracting party who has not fulfilled his obligations, effectively loses the reasonable time which could have been granted to him by the Court. It is the contracting party himself, however, who agreed to the terms of the smart contract and, therefore, to its method of enforcement and the inability to seek extension periods for defaults.

4.3.2 Breaches of Smart Contracts

A person who fails to discharge an obligation may be held liable in damages.²⁴⁹ These are due in respect of the loss the creditor has sustained and the profit which he was deprived of.²⁵⁰ When the obligation is limited to the payment of a sum, damages arising from the delay of performance consist in interests on the sum due at the rate of eight percent per annum.²⁵¹

In the case of the non-performance of an obligation, the creditor may perform the obligation himself at the expense of his debtor.²⁵² The creditor may also request that anything which was done by the debtor in breach of an obligation be undone. He may also be authorized by the courts to undo it himself and this at the expense of the debtor.²⁵³ If a time stipulated for the performance of an obligation elapses, the debtor is in default upon the lapse of such time.²⁵⁴

Damages may be claimed for losses sustained or for lost profits which may be attributed to the default when these were foreseeable at the time of agreement.²⁵⁵ If non-performance is fraudulent, damages are due even if the losses are unforeseeable. A creditor may also sue for *specific performance* of the obligations undertaken by the debtor.

Damages are due unless the debtor proves that:

- (a) the non-performance or delay was due to an extraneous cause not imputable to him;²⁵⁶
- (b) he was prevented from fulfilling his obligation due to an irresistible force or a fortuitous event.²⁵⁷ *Skond il-ġurisprudenza tal-Qrati tagħna “il-forza maġġuri hija dik il-forza li għaliha huwa impossibli li wieħed jirreżisti.”²⁵⁸*

²⁴⁸ Borda noe v Muscat, Civil Court, First Hall, 23 May 1984.

²⁴⁹ Art. 1125, Civil Code.

²⁵⁰ Art. 1135, Civil Code.

²⁵¹ Art. 1139, Civil Code.

²⁵² Art. 1127, Civil Code.

²⁵³ Art. 1129, Civil Code.

²⁵⁴ Art. 1130(1), 1131 Civil Code.

²⁵⁵ Ganado (n 100) 150.

²⁵⁶ Art. 1133, Civil Code.

“Force majeure”, or “irresistible force” or “fortuitous event” are used interchangeably in the Civil Code.²⁵⁹ For these to subsist, four elements must exist concurrently: (a) an irresistible force renders it impossible for a contracting party to fulfil an obligation; (b) this must be external; (c) it must be unpredictable; and (d) it could not have been foreseen by a *bonus pater familias*.²⁶⁰

In terms of Art. 1134 of the Civil Code: *The debtor shall not be liable for damages if he was prevented from giving or doing the thing he undertook to give or to do, or if he did the thing he was forbidden to do, in consequence of an irresistible force or a fortuitous event.*

Smart contracts “lack contract law’s sensitivity in recognizing the possibility of issues which may affect ... requirements.”²⁶¹ If obligations are not carried out due to force majeure and penalties have been included in a smart contract, this will perform as programmed and the penalty clause will be triggered. Indeed, the parties may cater for breaches themselves by imposing penalties. “A penalty clause is a clause whereby a person, for the purpose of securing the fulfilment of an agreement, binds himself to something in case of non-fulfilment.”²⁶² These are included by contracting parties to represent compensation for the damage which the creditor sustains by the non-performance of the principal obligation.²⁶³ This avoids lengthy and costly recourse to Courts in the case of non-performance. Due to the principles of equity and good faith, the Court may abate or mitigate penalties.²⁶⁴

In a smart contract scenario, if an obligation is not performed, penalties are triggered irrespective of whether the non-performance occurred due to a fortuitous event. If an oracle is involved, he may trigger a mechanism whereby the penalty clause is not activated. This will undoubtedly cause delay and will also deny the automated execution of smart contracts. However, it could possibly be the only solution to determine the cause of the breach, for example, the non-delivery of a package due to a postal strike, or whether this may be attributed to the creditor himself, for example, due to the non-acceptance of the package by the creditor, although this could be justified if the package did not contain the item agreed upon.²⁶⁵ Alternatively, recourse to the Court will have to be made by the debtor after paying the penalty through the smart contract.

²⁵⁷ Art. 1134, Civil Code.

²⁵⁸ Delia v Segretarju Permanenti et, Court of Appeal (Inferior) 19th May, 2004.

²⁵⁹ Alfred Zarb et v. Mondial Travel Agency, Court of Appeal, 30th January 2009; Mapfre Middlesea p.l.c. v Carmelo Saliba, Small Claims Tribunal, 9th January 2019.

²⁶⁰ George Farrugia et v Pacifika Masini noe, First Hall Civil Court, 7th January 2008.

²⁶¹ Blake (n 119) 36.

²⁶² Art. 1118, Civil Code.

²⁶³ Art. 1120, Civil Code.

²⁶⁴ Art. 1122, Civil Code.

²⁶⁵ Eric Tjong Tjin Tai, ‘Challenges of Smart Contracts’, in Larry A. DiMatteo, Michel Cannarsa and Cristina Poncibò (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2020) 98.

4.3.3 Errors and gaps

Traditional contracts may have bad or inconsistent drafting, particularly if drafted under tight deadlines.²⁶⁶ In this regard, code decreases ambiguity by “*turning promises into objectively verifiable technical rules*”²⁶⁷ and this leads to “*greater legal certainty, more precision and consistency, and more transparent and impartial decision-making.*”²⁶⁸

Smart contracts may, however, contain errors and gaps. These need to be addressed according to applicable or mandatory legal provisions or the parties’ intentions.²⁶⁹ This may be difficult to achieve in smart contracts as “*programmers will have to record, retest, validate and re-run the program.*”²⁷⁰ A suggestion is for smart contracts to have a “*built-in right for either party to suspend the automatic performance of a smart contract*”²⁷¹ but this may be somewhat counterproductive as automatic performance is the very reason such contracts are relied on.

Errors or gaps will therefore have to be solved through traditional remedies such as unjustified enrichment (*actio de in rem verso*) if an unintended benefit occurs due to an oversight in the code.²⁷² This is because it is unlawful for a person to profit to the detriment of others without just cause.²⁷³ If profit is made, the person who receives such profit is liable to pay compensation.

Damages may also be due if there is a discrepancy between the agreement as agreed between the parties and the smart contract itself. The software developer could be held liable under tort if he is negligent. However, open source software may be modified by anyone and “*there may be no link between one author and another, there may be no knowledge of reliance and no relationship between the software designer/s and the unilateral use of the software by a third-party.*”²⁷⁴ This will weaken any action based on tort.

4.4 Conclusion

It is a point worth labouring that the whole concept of ‘code is law’ misunderstands everything about law. In fact, the phrase is a bad metaphor for an impersonal, blind, and inexorable agent, which is very far from the nature of law as a process made up of multiple parts each holding the other in balance, and with remedies, safeguards, and recourse at every point, and which is applied according to the circumstances and exigencies of each case. Code, therefore, is not law, and neither are smart contracts. Nonetheless, smart

²⁶⁶ De Filippi and Wright (n 6) 81.

²⁶⁷ *ibid* 82.

²⁶⁸ DiMatteo, Cannarsa and Poncibò (n 1) 16.

²⁶⁹ Tanti and Ganado (n 92) 255.

²⁷⁰ *ibid*.

²⁷¹ *ibid* 256.

²⁷² *ibid* 256.

²⁷³ Art. 1028A, 1028B, Civil Code.

²⁷⁴ Tanti and Ganado (n 92) 258.

contracts can bring clarity, predictability, auditability, and ease of enforcement to contractual relationships.²⁷⁵

²⁷⁵ Stark (n 180).

CHAPTER 5: CONCLUSION

The aim of this dissertation was to provide an understanding of smart contracts and to analyse their nature, effects and enforcement in terms of the Maltese Civil Code. Its goal was to analyse whether smart contracts may be considered valid contracts in terms of the Civil Code and, if so, to consider to what extent they can operate as contracts and under what limitations.

What is certain is that the fact that a smart contract is called a “contract” does not mean that it gives rise to a binding agreement. This will only be the case if it fulfills the requirements essential for the validity of contracts established in terms of the Civil Code and any other applicable law. Validity will therefore need to be assessed on a case-by-case basis depending on the type of agreement and the counterparties involved.²⁷⁶

Smart contracts may, in certain cases, be considered legally binding under existing contract laws - if all essential elements are complied with - because legislative provisions are technologically neutral.²⁷⁷ It is unlikely that smart contracts will be accepted as legally binding contracts if the formality of a public deed is required at law and the law remains unchanged. In other cases, some principles of contract law rules will need to be revised and adjusted due to the characteristics of smart contracts, particularly issues relating to writings and signatures, so that smart contracts will formally constitute private writings in terms of law. It would be ideal to establish standards and best practices to maximise the potential of smart contracts so that there would be no doubt as to whether they are legally binding and enforceable at law.²⁷⁸

There is clearly a difference between the validity and binding nature of smart contracts and their effects in a practical sense. They are limited by the context of their nature as products of technology, operating in a cyber-domain, and that creates serious practical limitations. These limitations also limit their scope. Indeed, in most of the literature there is focus on automated enforcement of an obligation, such as a debt. The legal system is however so much more sophisticated and here we are dealing with a very simple and limited aspect.

What is also certain is that although the existing provisions of the Civil Code may – to a certain extent - recognise smart contracts, these will only be utilized and ‘promoted’ by practitioners if there is certainty in this area. No practitioner will advise on a contract governed by an uncertain area of law, trying to grapple with what the legislator intended to say, risking personal liability in the process. Indeed, the legal profession faces numerous problems “(a) *How can one advise on a smart contract unless one is conversant with the*

²⁷⁶ Tanti and Ganado (n 92) 260.

²⁷⁷ Gatt (n 187) 53.

²⁷⁸ Laura Camilleri, *Blockchain-based Smart Contracts’ Legal Enforceability in Malta and the UK: A Square Peg in a Round Hole?* (LLM in International Corporate and commercial Law, The University of York, 2019) 34.

*underlying code? (b) How can code be created that can discern degrees of reasonableness? (c) Does the creation of smart contract templates render legal advice less important?”*²⁷⁹

Smart contracts will only gain momentum if there is legal certainty, which due to Malta’s non-adherence to the principle of judicial precedent, will only be obtained if this is dealt with legislatively, either as a separate Sub-Title in Title IV “*Of Obligations*” in the Civil Code or by means of specific legislation as in the case of electronic contracts in the Electronic Commerce Act.²⁸⁰ Due to the potential of smart contracts and the new methods of doing business, it would be perhaps best to legislate specifically. An *ad hoc* law would establish the essential elements needed for smart contracts to be considered binding contracts, particularly when being used by consumers, to ensure that rights are fully protected. Although specific legislation may be viewed as a mistake by some as it may be considered to hinder innovation, it may become a necessity as ambiguity and abuses become evident in this area.²⁸¹

Clear dispositions are also to be drafted on the use of oracles, possible smart contract ‘audits’ and certification, the allocation of risk, dispute resolution mechanisms and conflict of law provisions and, of particular importance, on the attribution of responsibility in the case of a breach.²⁸²

It is therefore important that the Maltese legislator provides certainty in this area so that smart contracts may reach their full potential “*and prove to be a new opportunity for further development and not a legal challenge proved impossible to conquer.*”²⁸³ “*If blockchain will indeed become the catalyst for innovation, jobs and economic growth in the EU that many hope, then there is no doubt that a key element will be a predictable legal and regulatory framework for blockchains and smart contracts.*”²⁸⁴

Irrespective of any legislative intervention, the status of smart contracts will eventually be tested by the Courts and they remain free to annul a smart contract which does not contain any condition which is essential to its validity, to imply terms into the code, such as the duty to act as *bonus pater familias*, and its adherence to customary clauses. Ambiguous terms will undoubtedly be interpreted according to usage. “*It is reasonable to suppose that the courts probably will not take a fundamentally different approach to contract law in relation to a smart contract from that routinely applied by them in relation to any other document ... or a set of circumstances that is claimed to have legally binding contractual effect.*”²⁸⁵

It is likely that there will be some shift in the role of the courts as smart contracts are adopted as a useful complement to traditional legal contracts. *Contract law is generally viewed as a remedial institution whose function is to adjudicate any issues that arise*

²⁷⁹ DiMatteo, Cannarsa and Poncibò (n 1) 16.

²⁸⁰ Cap. 426, Laws of Malta.

²⁸¹ DiMatteo, Cannarsa and Poncibò (n 1) 18.

²⁸² Ian Gauci, ‘Blockchain and Smart Contracts: the possible manifesto for legal personality and certainty’, The Malta Independent, 8th April, 2018.

²⁸³ Blake (n 119) 53-54.

²⁸⁴ EU Blockchain Observatory Forum, <https://www.eublockchainforum.eu/>.

²⁸⁵ Norton Rose Fulbright (n 123) 14.

*between two individuals or entities after transactional activity.*²⁸⁶ It is possible that smart contracts will lift the burden of enforcement of obligations off the shoulders of the Courts, freeing up time that may be devoted to providing remedies *ex post*, no doubt partly undoing what has already been executed by the smart contract. This will lead to increased emphasis during the drafting stage of the agreement. As is the case with legal advisors, it is unlikely that the Courts will have the technical skills required to interpret smart contracts, leading to the risk that the computer code will be misinterpreted.²⁸⁷ To avoid this, smart contracts are to be accompanied with interpretative rules (or a ‘legal wrapper’) indicating what the smart contract intends to achieve and, in the case of conflict between the code and such interpretative rules, the latter are to prevail. This ‘legal wrapper’ may even contain those obligations which may not be easily translated into code, such as, actions which are to take place on the occurrence of a ‘*material adverse event*’.²⁸⁸ This “code-and-contract” solution has been suggested by a number of practitioners²⁸⁹ and scholars.²⁹⁰ What is certain is that even if they are not recognised at law and, therefore, not legally enforced by the Court, smart contracts will continue to be used due to the efficiency they provide and this will lead to a “*private regulatory framework*”²⁹¹ between the parties, separate from that provided by national courts.

Notwithstanding their efficiency, it is unlikely that smart contracts will replace traditional contracts. Neither will they render the legal profession extinct. Their role may change, and they may have to become familiar with code to ensure that smart contracts reflect and execute as intended by the parties, but contracts will remain “*fundamentally a human activity.*”²⁹²

²⁸⁶ Ronald C. Griffin, ‘Standard Form Contracts’ (1978) 9 North Carolina Central Law Journal 158-77(178) <https://archives.law.nccu.edu/ncclr/vol9/iss2/3/>.

²⁸⁷ Cannarsa (n 197) 112.

²⁸⁸ Lim, Saw, Sargeant (n 103).

²⁸⁹ Rachel Lidgate and Charlie Morgan, ‘Hashing Out the Implication of Smart Contracting under English Law’ (Herbet Smith Freehills, London, 2 October 2018).

²⁹⁰ Durovic and Janssen (n 66) 770; Eliza Mik, ‘Electronic Platforms: Openness, Transparency and Privacy Issues’ (September 24, 2018) European Review of Private Law 6-2019, Available at SSRN: <https://ssrn.com/abstract=3362987>.

²⁹¹ Woebeking (n 3) para 1.

²⁹² Sklaroff (n 199) 303.

BIBLIOGRAPHY

Books

Antonopoulos AM, *Mastering Bitcoin: Programming the Open Blockchain* (Second edition, O'Reilly Media 2018)

Antonopoulos AM, *The Internet of Money Volume Three: A Collection of Talks by Andreas M. Antonopoulos* (Merkle Bloom LLC 2019)

Antonopoulos AM and Wood G, *Mastering Ethereum: Building Smart Contracts and DApps* (Kindle edition, O'Reilly Media 2019)

Bambara JJ and Allen PR, *Blockchain: A Practical Guide to Developing Business, Law, and Technology Solutions* (Kindle edition, McGraw-Hill Education 2018)

Carrara F, *Programma del Corso di Diritto Criminale, Volume V - Parte Speciale*, (Seventh edition, Libreria Fratelli Cammelli Editori 1899)

De Filippi P and Wright A, *Blockchain and the Law: The Rule of Code* (Harvard University Press 2018)

DiMatteo LA, Cannarsa M and Poncibò C (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2020)

Drescher D, *Blockchain Basics* (Kindle edition, Berkeley, CA: Apress 2017)

Finck M, *Blockchain Regulation and Governance in Europe* (Cambridge University Press 2019)

Ganado M, *An Introduction to Maltese Financial Services Law* (Allied Publications 2009)

Girasa R, *Regulation of Cryptocurrencies and Blockchain Technologies* (Springer International Publishing 2018)

Lessig L, *Code and Other Laws of Cyberspace* (Basic Books 1999)

Swan M, *Blockchain: Blueprint for a New Economy* (O'Reilly Media 2015)

Swanson T, *Great Chain of Numbers: A Guide to Smart Contracts, Smart Property and Trustless Asset Management* (Kindle Edition 2014)

Chapters in Edited Books

Borgogno O, 'Usefulness and Dangers of Smart Contracts in Consumer Transactions' in DiMatteo LA, Cannarsa M and Poncibò C (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2020)

Cannarsa M, 'Contract Interpretation' in DiMatteo LA, Cannarsa M and Poncibò C (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2020)

Caria R, 'Definitions of Smart Contracts' in DiMatteo LA, Cannarsa M and Poncibò C (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2020)

DiMatteo LA, Cannarsa M and Poncibò C, 'Smart Contracts and Contract Law' in DiMatteo LA, Cannarsa M and Poncibò C (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2020)

Durovic M and Janssen A, 'Formation of Smart Contracts under Contract Law' in DiMatteo LA, Cannarsa M and Poncibò C (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2020)

Fabri JP and Fabri S, 'Blocknomics' in Young PL and Debono JA (eds), *DLT Malta: Thoughts from the Blockchain Island* (First edition, DV Books 2019)

Ganado M, 'The Essential Elements of a Contract' in Ganado M (ed.), *An Introduction to Maltese Financial Services Law* (Allied Publications 2009)

Mik E, 'Blockchains A Technology for Decentralised Marketplaces' in DiMatteo LA, Cannarsa M and Poncibò C (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2020)

Poncibò C and DiMatteo LA, 'Smart Contracts Contractual and Noncontractual Remedies' in DiMatteo LA, Cannarsa M and Poncibò C (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2020)

Tai ETT, 'Challenges of Smart Contracts' in DiMatteo LA, Cannarsa M and Poncibò C (eds), *The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms* (Cambridge University Press 2020)

Tanti L and Ganado M, 'Regulating Smart Contracts' in Young PL and Debono JA (eds), *DLT Malta: Thoughts from the Blockchain Island* (First edition, DV Books 2019)

Journal Papers

Blemus S, 'Law and Blockchain: A Legal Perspective on Current Regulatory Trends Worldwide' (2017) 4 Corporate Finance and Capital Markets Law Review RTDF

Catchlove P, 'Smart Contracts: A New Era of Contract Use' (2017) Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3090226

Cuccuru P, 'Beyond bitcoin: an early overview on smart contracts' (2017) 25 (3) International Journal of Law and IT

Dell'Erba M, 'Demystifying technology. Do smart contracts require a new legal framework? Regulatory fragmentation, self-regulation, public regulation' (2018) University of Pennsylvania Journal of Law & Public Affairs
<https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3228445> accessed on 12th May 2020

Griffin RC, 'Standard Form Contracts' (1978) 9 North Carolina Central Law Journal 158-77(178) <https://archives.law.nccu.edu/ncclr/vol9/iss2/3/>

Jaccard G, 'Smart Contracts and the Role of Law' (2018) Available at SSRN: <https://ssrn.com/abstract=3099885> or <http://dx.doi.org/10.2139/ssrn.3099885>

Karamanlioğlu A, 'Concept of Smart Contracts – A Legal Perspective' (2018) 35 KOSBED 29-42

Kierkegaard S, 'E-Contract Formation: U.S. and E.U. Perspectives (2007) 3 Shidler J. L. Com. & Tech. 312

Lauslahti K, Mattila J & Seppälä T, 'Smart Contracts – How will Blockchain Technology Affect Contractual Practices' (2017) Available at: <https://pub.etla.fi/ETLA-Raportit-Reports-68.pdf>

Levi SD and Lipton AB, 'An Introduction to Smart Contracts and their Potential and Inherent Limitations' (2018) Harvard Law School forum on Corporate Governance

Lidgate R and Morgan C 'Hashing Out the Implication of Smart Contracting under English Law' (2018) Herbet Smith Freehills, London

Lim C, Saw TJ, Sargeant C, 'Smart Contracts: Bridging the Gap Between Expectation and Reality' (2016) Oxford Business Law Blog, Available at <https://www.law.ox.ac.uk/business-law-blog/blog/2016/07/smart-contracts-bridging-gap-between-expectation-and-reality>

Mik E, 'Electronic Platforms: Openness, Transparency and Privacy Issues' (2018) European Review of Private Law 6-2019, Available at SSRN: <https://ssrn.com/abstract=3362987>

Mik E, 'Smart Contracts: A Requiem' (2019) Journal of Contract Law, Forthcoming, Available at SSRN: <https://ssrn.com/abstract=3499998> or <http://dx.doi.org/10.2139/ssrn.3499998>

Mik E, 'Smart Contracts: Terminology, Technical Limitations and Real World Complexity' (2017) Available at SSRN: <<https://ssrn.com/abstract=3038406>> [Accessed 12th May 2020]

Raskin M, 'The Law and Legality of Smart Contracts' (2017) 1 Georgetown Law Technology Review

Savelyev A, 'Contract Law 2.0: Smart Contracts as the Beginning of the End of Classic Contract Law' (2017) 26 (2) Information & Communications Technology Law

Sklaroff JM, 'Smart Contracts and the Cost of Inflexibility' (2017) 166 U. PA. L. REV. 263 Available at: https://scholarship.law.upenn.edu/penn_law_review/vol166/iss1/5

Weirbach K and Cornell N, 'Contracts Ex Machina' (2017) 67 Duke Law Journal 324

Weitzenboeck EM, 'Electronic Agents and the Formation of Contracts' (2001) 9 (3) International Journal of Law and Information Technology

Woebeking MK, 'The Impact of Smart Contracts on Traditional Concepts of Contract Law' (2019) 10 (3) JIPITEC 106

Online Materials

Buterin V, 'Ethereum White Paper: A Next Generation Smart Contract & Decentralised Application Platform' (2014) Available at: <<https://ethereum.org/en/whitepaper/>> [Accessed 25th September 2020]

Chance C, 'Are Smart Contracts Contracts? Talking Tech Looks at the Concepts and Realities of Smart Contracts' (2017) <https://talkingtech.cliffordchance.com/en/emerging-technologies/smart-contracts/are-smart-contracts-contracts.html>

Gauci I, 'Blockchain and Smart Contracts: the possible manifesto for legal personality and certainty', The Malta Independent, 8th April, 2018

Hansen JD, Rosini L, Reyes CL, *More Legal Aspects of Smart Contract Applications* (White Paper, Perkins Coie LLP, 2018)

Hayes F, 'The Story So Far' (2002) Available at: <http://www.computerworld.com/article/2576616/e-commerce/the-story-so-far.html> [Accessed 29th September 2020]

Joint Economic Report, Report of the Joint Economic Committee, Congress of the United States on the 2018 Economic Report of the President, Chapter 9: "Building a Secure Future, One Blockchain at a Time" (13 March 2018)

Nakamoto S, 'Bitcoin: A Peer-to-Peer Electronic Cash System' (2008) <<https://bitcoin.org/en/bitcoin-paper>> [Accessed 12th May 2020]

Nakamoto S, 'Bitcoin open source implementation of P2P currency' (2009) Available at <https://satoshi.nakamotoinstitute.org/posts/p2pfoundation/1/> [Accessed 26th Oct 2020]

Norton Rose Fulbright, *Smart Contracts: coding the fine print. A legal and regulatory guide* 03/16 (UK)

Stark J, 'How close are smart contracts to impacting real-world law?' (Coindesk, April 11 2016) <<https://www.coindesk.com/blockchain-smarts-contracts-real-world-law>>.

Szabo N, 'Smart Contracts' (1994) [online] Available at: <http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.html> [Accessed 25 September 2020]

Szabo N, 'Smart Contracts: Building Blocks for Digital Markets' (1996) [online] Available at: <https://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.2.html> [Accessed 29 September 2020]

Vella Falzon N and Grima P, Fenech & Fenech Advocates, 'Security and quasi-security vehicles for lenders in Malta: an increasingly creditor-friendly jurisdiction' (2020) Practical Law, Available at: [https://uk.practicallaw.thomsonreuters.com/7-562-4947?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/7-562-4947?transitionType=Default&contextData=(sc.Default)&firstPage=true)

Theses

Blake E, *Smart contracts: legal regulation in a decentralized environment* (LL.B., University of Malta 2019)

Camilleri L, *Blockchain-based Smart Contracts' Legal Enforceability in Malta and the UK: A Square Peg in a Round Hole?* (LLM in International Corporate and Commercial Law, University of York 2019)

Formosa R, *The Offence of Ragion Fattasi*, (LL.D. Thesis, University of Malta 2011)

Gatt G, *Do the Existing Laws cover Smart Contract or do we need a new set of laws to deal with them?* (LL.B., University of Malta 2019)

Vella A, *A Critical Analysis of the Architect's Professional Liability* (LL.D. Thesis, University of Malta 2010)

Notes

Caruana Galizia V, *Notes on Civil Law* (Laws III Year, revised by Ganado JM, Old University 1978)

Professor Sir A. J. Mamo, *Notes on Criminal Law, Volume II* (Ghsl Publications)