Länsstyrelsen Skåne

Interreg North Sea Region BLING

European Regional Development Fund

EUROPEAN UNION

THE EU LEGISLATION AND BLOCKCHAIN

WHAT WE CAN AND CAN´T DO

SWECO

EXECUTIVE SUMMARY

This report provides an overview of current EU policy and regulation with regards to blockchain technology, summarising the most oft-discussed challenges related to blockchain technology vis-à-vis EU legislation, and highlighting some of these challenges with case law in EU member states.

The EU's strategy broadly revolves around setting the conditions for an open, innovative, trustworthy, transparent, and EU law-compliant data and transactional environment. It can be summarised by highlighting the three main institutions at the heart of blockchain implementation in Europe:

- **The European Parliament** adopted a Motion for a Resolution on Distributed ledger technologies and blockchains: building trust with disintermediation (October 2018). In May 2018, the Fifth Anti-Money Laundering Directive (5AMLD) was adopted by the European Parliament and the Council of the European Union, a good example of a regulation that directly takes blockchain technology into consideration.
- **The European Commission** has taken positive steps to promote blockchain innovation across Europe. Notably, The European Blockchain Partnership (EBP) is a declaration that joins all EU Member States and members of the European Economic Area (Norway and Liechtenstein) at a political level.
- **The EU Blockchain Observatory and Forum** (launched by the European Commission in collaboration with the European Parliament) is an important tool for assessing blockchain-related policies at EU level.

The EU therefore has a well-developed legal and regulatory environment that puts it at an advantage in developing a suitable framework for blockchain technology. Notwithstanding, some fundamental areas remain in which there is little legal and regulatory clarity or unity, such as:

- The need for legal certainty and regulation clarity in order to spur innovation
- The legal status of smart contracts
- Practical problems related to allocating liability and responsibility for legal compliance with so many actors involved in blockchain technology
- The trade-off between transparency and privacy, which remains one of the most disputed issues in the blockchain space
- The challenge of reconciling Europe's new General Data Protection Regulation (GDPR) with blockchain
- The tension between blockchain reality and legal reality as a "technical design vs human governance" issue.

The use of blockchain technology in the public sector certainly has the potential to elevate levels of trust and transparency, but innovation also requires legal certainty. One of the main obstacles for blockchain technology in the public sector is the need to change or adapt existing legal frameworks, both EU-wise and Member State-specific alike.

Overall, current research does not provide clear-cut answers to the question of what we can and cannot do. Most of the literature highlights the benefits (and limitations) of using blockchain technology, but the legal questions will likely need to be specifically addressed and/or defined – both on national and EU-level.

This report showcases the multifaceted nature of the relationship between law and technological innovation. Provided that innovators are given the necessary flexibility, blockchain can spur innovation and increase levels of trust between citizens and the public sector. Yet blockchain also needs to be compliant with legal requirements and public policy objectives. New technology not only changes the way we apply existing regulation – decentralised structures also challenge the core regulatory architecture.

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GLOSSARY

4AMLD Fourth Anti-Money Laundering Directive

5AMLD Fifth Anti-Money Laundering Directive

AI Artificial intelligence

AML Anti-money laundering

DLT Distributed ledger technologies

NGO Non-governmental organisation

VAT Value added tax

ABOUT THIS REPORT

This report is commissioned by the County Administrative Board of Skåne, one of 13 partners in the BLING (BLockchain IN Government) project funded by the Interreg North Sea Region Programme 2014 – 2020. The project combines the expertise of knowledge institutions and the playing field of municipalities and governmental organisations together with businesses and citizens, thereby investigating what role blockchain can play for governments.

CREDITS

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PURPOSE AND STRUCTURE OF THE REPORT

The intended purpose of this report is to stimulate interest and innovation within the public sector regarding blockchain technology, and to increase knowledge and understanding of its potential uses and applications. This report is part is accompanied by another report focusing on blockchains relationship with democracy.[1]

This report will be divided into two main sections. Firstly, it will provide an overview of current EU policy and regulation with regards to blockchain technology, which includes mapping existing EU policies, strategies, statements, directives and legislation related to or affecting blockchain. Secondly, the report will discuss challenges related to blockchain technology and innovation vis-à-vis EU legislation, and how policy and regulation might be affected by blockchain technology. The latter part will also be illustrated by case law in EU member states, an area which may have a significant impact on how blockchain technology will manifest and be used in the public sector in the future.

METHODS, SCOPE AND DELIMITATIONS

Our analysis is focused on existing literature related to blockchain. In some circumstances, we also include conference reports or other material available, but the bulk of our data collection efforts have been targeted towards existing literature. The report should therefore be read as a synthesis of available research and literature on the EU legislation and blockchain.

Our focus is on providing an overview of current EU policy and regulation with regards to blockchain technology, summarising the most oft-discussed challenges related to blockchain technology vis-à-vis EU legislation, and highlighting some of these challenges with case law in EU member states. We do not claim to be able to provide conclusive answers to all the questions that are raised, or to describe in detail any definitive legal ramifications of blockchain technology in the EU – this reflects the state of existing literature and research, which show that many challenges

[1] See: Blockchain: Obstacles and opportunities for democracy development. This report will explore how blockchain impacts democratic processes and the implications for public sector.

are still under discussion, and their solutions still under construction. Discussion of the technology will only be involved to the degree required for understanding the content.

Given the wealth of publications on the topic these reports are intended as an introduction for non-technical readers. Readers in search of greater precision should consult the sources listed in the reference section.

1.

INTRODUCTION

1. INTRODUCTION

We live in exciting times. Digitalisation affects us all and is horizontal in that it has a wide impact across borders, sectors and organisations, be they private or public. The digital transformation of public services is taking place at a rapid pace across Europe and beyond, and leadership is needed on all levels of the public sector in order to make full use of its potential.

The relationship between legal architecture and technology and innovation is complex. Given that public and private innovators are given the flexibility needed, blockchain technology has the potential to stimulate innovation and increase levels of trust between the public sector and its citizens. At the same time, blockchain technology needs to be aligned with current legal requirements as well as policy objectives. New technology not only affects how we apply current regulations – the decentralized nature of technology will inevitably present challenges to the legal architecture as we know it.

KEY CONCEPTS

The terminology in the field och blockchain is rapidly evolving and accepted definitions have not yet been formalized. Blockchain is simply put an architecture or data structure that employs cryptography and algorithms to record data in an immutable manner.

'Distributed ledgers' (DLs) are a specific implementation of the broader category of 'shared ledgers', which are simply defined as a shared record of data across different parties. A shared ledger can be a single ledger with layered permissions or a distributed ledger which consists of multiple ledgers maintained by a distributed network of nodes, as defined above. In this document, we are commonly using the term distributed ledgers (DLs), and specifically use the term blockchain only when referring to DLs that use a blockchain data structure. DLs are categorized as permissioned or permissionless, depending on whether network participants (nodes) need permission from any entity to make changes to the ledger. Distributed ledgers are categorized as public or private depending on whether the ledgers can be accessed by anyone or only by the participating nodes in the network.

NOTE ON TERMINOLOGY: BLOCKCHAIN AND DISTRIBUTED LEDGER TECHNOLOGY

Technically, blockchain technology is only one explicit type of distributed ledger technology. Not all distributed ledgers employ blockchains and, conversely, blockchain technology could be used in other contexts. However, the terms 'blockchain technology' and 'distributed ledger technology' are generally used interchangeably. There are other categories of DLT, not relying on a 'chain of data blocks' as the primary technical data structure. However, commonly, the term 'blockchain' is now usually used as a catch-all for all sorts of DLT. We apply the same principle for this document and use blockchain interchangeably with DLT. The European Commission also employs an understandable explanation[2] what Blockchain is:

"*Blockchain is the best-known distributed ledger technology. A ledger is a database which keeps a final and definitive record of transactions. Records, once stored, cannot be tampered without leaving behind a clear track. Blockchain enables a ledger to be held in a network across a series of nodes, which avoids one centralised location and the need for intermediaries' services. This is particularly helpful for providing trust, traceability and security in systems that exchange data or assets. There is a lot of potential for blockchain to be used in many different areas such as financial services, supply chains or healthcare.*"

BLOCKCHAIN EXPLAINED

It is difficult to describe blockchain without becoming too technical. When Satoshi Nakomoto introduced the world to the technology in 2008 its main function was to serve as a distributed digital ledger for Bitcoin transactions.[3] Today blockchain is by some commentators referred to as one of the foremost technological innovations of the past decade.

The technology enables large groups of individuals or entities, whether collaborators or competitors, to reach consensus on and immutably record this agreed-upon record of the truth permanently without a central authority. At its core, blockchain is simply a shared ("distributed" or "decentralised") database, what often referred to as a digital ledger. This ledger in turn uses cryptographic algorithms to verify the creation of digital assets and transactions taking place over a peer-to-peer network. Contrary to traditional databases, there is no need for a single party to keep records of all transactions that happen within a given system and no need for a single database. Data is instead

[2] European Commission, DG CONNECT, 2019-06-11. How can Europe benefit from blockchain technologies? Url: https://ec.europa.eu/digital-single-market/en/news/how-can-europe-benefit-blockchain-technologies
[3] Nakamoto, S. (2008). Bitcoin: A Peer-to-Peer Electronic Cash System. URL: https://bitcoin.org/bitcoin.pdf

cryptographically distributed across a diffuse network of nodes (e.g. servers or computers). By emphasising data redundancy with all network participants having a copy of the database, blockchain cuts out the need of a central ledger keeper and delegates this function of verifying and recording transactions to the users making the transactions. With the help of the of consensus protocols, users can then verify that all users are keeping the same records and that everyone has the same copy of the agreed-upon data (no one can alter the data). Blockchain technology has because of this been referred to as a "trust machine" since it provides an elegant solution to the problem of trust between networks and can enable large number of strangers to complete transactions with each other without risk of being cheated.

Figure 1. Simplified schematic of how a blockchain functions

Given the many and complex software architectures blockchain is currently deployed in we take a birds-eye view of the principles behind the technology rather than look at specific technical implementations.[4] The principles can in summary be said to be:

- **Widely distributed and redundant:** the blockchain platform is itself widely distributed, so that the information contained in the ledger exists in multiple locations, leading to high fault tolerance (failure of one or more components of the network does not cause failure of the entire system);
- **Degrees of transparency:** The ledgers are auditable by a predefined set of participants. For instance, in an open (public) blockchain everyone with internet access had the ability to verify the ledger. Records are there for transparent and auditable. A ledger can contain plain text, be entirely encrypted, or broken into discrete elements, each needing a different encryption key, which enables a flexible model of information transparency;
- **Immutable and secure:** the blockchain ledger function under the principle of irreversibility of records; once a transaction is recorded, any change or tampering of that record cryptography is computationally impractical and cannot secretly be altered without letting the networking know. Any break would disturb the computed links (hash code) that connects each block with the preceding block breaking the "chain" and revealing the inconsistency. It is therefore easy to audit a blockchain and the links are visible to all permissioned users. Though security is a relative concept, blockchains are relatively secure because of this, it provides a tamper-proof ledger that is irreversible.;
- **Decentralised consensus:** the mechanism used to commit a record to the ledger involves some form of consensus and can in some sense be thought of as "democratic" in the sense that a majority rules in determining what transactions are true and correct. There is no reliance on third parties or central authority to approve transactions and set rules. Untrusted participants reach consensus together.

Its most famous use case and the first asset on the blockchain was the cryptocurrency Bitcoin – a form of digital money not backed by any state. Beyond digital currencies, blockchains can be used to represent, track and trade a range of other types of assets. Today blockchain has evolved into a multipurpose technology, some advocates even argue a general-purpose technology[5]. Advocates see blockchain as a game changing technology that will enable building a fairer, more secure and democratic digital economy that a has the potential to change both public and private sector radically.

[4] "Blockchain and Suitability for Government Applications", Public-Private Analytic Exchange Program, 2018. URL: https://www.dhs.gov/sites/default/files/publications/2018_AEP_Blockchain_and_Suitability_for_Government_Applications.pdf
[5] A general purpose technology is a technology that has the potential to drastically alter societies through their impact. Classic examples include the steam engine and electricity.

2.

THE POLICY, LEGAL AND REGULATORY FRAMEWORK IN THE EU

2. THE POLICY, LEGAL AND REGULATORY FRAMEWORK IN THE EU

Blockchain is a technology that allows people and organisations to reach agreement on and permanently record transactions and information in a transparent way without a central authority. The European Commission sees blockchain as having the potential to become an important tool for building a fair, inclusive, secure and democratic digital economy[6], yet this also brings significant implications for how we think about our economic, social and political institutions – as well as our legal framework.

WHAT IS THE EU STRATEGY?

The European Commission aims at positioning Europe at the forefront of blockchain innovation and uptake. The EU relies on several initiatives and policies to promote cooperation and investments in deploying blockchain/DLT-based applications, support international standard setting and facilitate dialogue between industry stakeholders and regulators. The EU's strategy broadly revolves around setting the conditions for an open, innovative, trustworthy, transparent, and EU law-compliant data and transactional environment. The aim is to enable an EU-level framework supporting blockchain-based services that respects the maximum harmonisation principle of the Single Market, and builds on the EU acquis[7].[8]

The decentralised and collaborative nature of blockchain technology, combined with close Member State cooperation, can help avoiding fragmented approaches to blockchain development and – as much as possible – ensure the interoperability and wider deployment of blockchain-based services across the EU. Such fragmentation could undermine the Digital Single Market through a proliferation of multiple blockchain solutions for the same type of public services across the Union, using protocols and applications that would not be interoperable and requiring significant additional investments by public authorities both at national and EU level.

This section will structure the overview of EU blockchain strategy by highlighting three main institutions at the heart of blockchain implementation in Europe: the European Parliament, the European Commission, and the EU Blockchain Observatory and Forum.[9]

THE EUROPEAN PARLIAMENT

A safe, clear and coherent regulatory framework is important for confident use of a new technology. Recent legislative initiatives suggest a strong will from the European Parliament to work towards a regulatory framework that will bring legal certainty to blockchain development and adoption.

- The European Parliament adopted a **Motion for a Resolution on Distributed ledger technologies and blockchains: building trust with disintermediation** (October 2018)[10]. The motion calls on the European Commission to undertake policy initiatives related to Distributed Ledger Technologies (DLTs) that will advance the EU's competitive position and positively affect many sectors, ranging from energy, transport, supply chains and finance to health, education, and the creative industries. This motion prepares the ground for further action by functioning as a reference point for blockchain-related reports in Parliament and – along with policy directions – providing guidelines to the Commission.
- Building on this motion, the European Parliament passed the **Report on Blockchain: a forward-looking trade policy (December 2018)**[11], which highlights current sub-optimal issues in supply chains, EU trade policy and customs procedures, thereby identifying benefits that could be gained from widespread blockchain

[6] European Commission, DG CONNECT, 2020-01-15. *Blockchain Technologies.* URL: https://ec.europa.eu/digital-single-market/en/blockchain-technologies
[7] The EU's 'acquis' is the body of common rights and obligations that are binding on all EU countries, as EU Members.
[8] European Commission, DG CONNECT, 2020-01-15. *Blockchain Technologies.* URL: https://ec.europa.eu/digital-single-market/en/blockchain-technologies
[9] GovChain (2020). *European Union.* URL: https://govchain.world/european-union/
[10] URL: https://www.europarl.europa.eu/doceo/document/B-8-2018-0397_EN.html
[11] URL: https://www.europarl.europa.eu/doceo/document/A-8-2018-0407_EN.html

uptake. The report recommends gradual policy steps for the European Commission and Member States so as to enable the full functioning of blockchain technology.

- The rapid rise in the use of cryptocurrencies has led to growing concerns over the use of blockchain technology for transferring value in a way that circumvents authorities and regulatory oversight. In October 2015, the European Court of Justice ruled that Bitcoin transactions should be exempt from the value added tax (VAT), in response to a request by Swedish tax authorities, which effectively recognized Bitcoin as a legitimate means of payment in Europe, putting it in the same category as other currencies for tax purposes. In May 2018, **the Fifth Anti-Money Laundering Directive (5AMLD)**[12] was adopted by the European Parliament and the Council of the European Union. While EU directives that directly take blockchain technology into consideration are still in their cradle, 5AMLD is a good example of a regulation that attempts to do so. The Directive – which came into force on 10 January 2020 – considers cryptocurrencies and cryptocurrency exchanges "obliged entities", facing them with the same regulations applied to financial institutions under the Fourth Anti-Money Laundering Directive (4AMLD). 5AMLD goes further than 4AMLD in its reporting obligations by giving Financial Intelligence Units (FIU) a mandate to obtain the addresses and identities of owners of virtual currency – which challenges the anonymity (or pseudonymity) associated with the use of cryptocurrency. 5AMLD also introduces regulation for providers of cryptocurrency exchanges and wallets, which must now be registered with the competent authorities in their domestic locations. The Directive also introduced a legal definition of virtual currencies:

> [...] a digital representation of value that is not issued or guaranteed by a central bank or a public authority, is not necessarily attached to a legally established currency and does not possess a legal status of currency or money, but is accepted by natural or legal persons as a means of exchange and which can be transferred, stored and traded electronically[13].

THE EUROPEAN COMMISSION

The European Commission has taken encouraging steps to promote blockchain innovation across Europe. Notably, **The European Blockchain Partnership (EBP)** – launched in April 2018 – is a declaration that joins all EU Member States and members of the European Economic Area (Norway and Liechtenstein) at a political level. The signatories aim to align policies and regulatory approaches to blockchain, to cooperate towards realising the potential of blockchain-based services, and to ensure interoperability and help overcome obstacles for spreading the use of innovative digital solutions across the EU. Jointly with the European Commission, the EBP is building a **European Blockchain Services Infrastructure (EBSI)** which will support the delivery of EU-wide cross-border public services using blockchain technology. In 2020, EBSI will deploy a network of distributed blockchain nodes across Europe.[14] EBSI aims to have a first operational version up and running in 2020, supporting one or more prototype applications that can be tested by Member States. The number of applications supported by EBSI will continue to grow, driven by use cases identified by the European Commission and the Member States.[15]

Two Directorate-Generals are key to the EU's blockchain strategy: Directorate-General for Financial Stability, Financial Services and Capital Markets Union (DG FISMA), and the Directorate-General for Communications Networks, Content and Technology (DG CONNECT).

- DG FISMA's main input has been through the **FinTech Action Plan** (March 2018)[16]. The Plan aims to aid the financial industry in making use of rapid tech advancements including blockchain.
- In December 2019, DG CONNECT launched an open market consultation **for European Blockchain Pre-Commercial Procurement (PCP).** The PCP is looking for novel blockchain solutions for the European Blockchain Service Infrastructure (EBSI). The open market consultation offers an opportunity to provide feedback on the scope of the future PCP, and to be involved in and co-create the future development of EU-wide

[12] URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32018L0843
[13] URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32018L0843
[14] European Commission, DG CONNECT, 2020-01-15. *Blockchain Technologies.* URL: https://ec.europa.eu/digital-single-market/en/blockchain-technologies
[15] European Commission, CEF Digital, 2019-09-25. *The European Blockchain Services Infrastructure is on its way.* URL: https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/2019/09/25/The+European+Blockchain+Services+Infrastructure+is+on+its+way
[16] European Commission, DG FISMA, 2019-03-08. *FinTech Action Plan.* URL: https://ec.europa.eu/info/publications/180308-action-plan-fintech_en

blockchain solutions. The blockchain PCP focuses on the development and testing of a novel distributed ledger or blockchain solution which builds on the EU legal framework, in particular the GDPR Regulation, the eIDAS Regulation and the NIS Directive. Starting in 2020, the PCP aims to deploy solutions within the next three years.[17]

In December 2019, the Economic and Financial Affairs Council (ECOFIN) adopted the final version of the **Joint Council and Commission statement on 'stablecoins'**[18]. The Joint Statement calls for a common EU approach to crypto-assets, including stablecoins, which may potentially include new legislation. However, until legal certainty is established, global stablecoin initiatives should not operate in the EU.

The European Commission also supports policy and research in the area. The **Joint Research Centre (JRC)** – the European Commission's science and knowledge service – has published several reports related to blockchain.

Overall, the EU aims at promoting an enabling DSM (Digital Single Market) framework, and legal certainty would be necessary if organisations and businesses were to operate across such a market without obstacles. The European Commission has highlighted **two areas related to blockchain which could benefit from improved legal certainty**[19]:

- **Smart contracts**: whether the current legal framework is sufficiently clear to ensure the enforceability of smart contracts and clarify jurisdiction in case of legal disputes.
- **Tokenisation**: whether the current legal framework is appropriate for issuing and trading tokens (i.e.: crypto assets), when they are not considered as financial instruments.

As a result, the 'Study on Blockchains: Legal, Governance and Interoperability Aspects' was commissioned and published in 2019, examining legal and regulatory aspects and socio-economic impacts of blockchain-inspired technologies.[20]

EU BLOCKCHAIN OBSERVATORY AND FORUM

Launched in February 2018 by the European Commission in collaboration with the European Parliament, and run under the aegis of DG CONNECT, the EU Blockchain Observatory and Forum is an important tool for assessing blockchain-related policies at EU level. The Observatory provides leadership and strategy, and acts as a stakeholder engagement platform, as well as an initiative to accelerate blockchain innovation and the development of the blockchain ecosystem within the EU. It does so through knowledge sharing, community engagement, project mapping, working groups on use cases and the regulatory framework, and training. It organises workshops and produces thematic reports with the help of European and international stakeholders, making deeper investigations into key blockchain themes, including the legal and regulatory framework.[21] Although the Observatory does not have direct legal significance, its reports[22] are considered by the Commission when assessing legislative action.

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[17] European Commission, DG CONNECT, 2020-04-16. *Online registration for the open market consultation event of the European Blockchain Pre-Commercial Procurement is open*. URL: https://ec.europa.eu/digital-single-market/en/news/online-registration-open-market-consultation-event-european-blockchain-pre-commercial

[18] Council of the European Union, 2019-12-05. *Joint statement by the Council and the Commission on "stablecoins".* URL: https://www.consilium.europa.eu/en/press/press-releases/2019/12/05/joint-statement-by-the-council-and-the-commission-on-stablecoins/

[19] European Commission, DG CONNECT, 2020-01-15. *Blockchain Technologies*. URL: https://ec.europa.eu/digital-single-market/en/blockchain-technologies

[20] European Commission (2020). *Study on Blockchains: Legal, Governance and Interoperability Aspects (SMART 2018/0038)*. URL: https://ec.europa.eu/digital-single-market/en/news/study-blockchains-legal-governance-and-interoperability-aspects-smart-20180038

[21] European Commission, DG CONNECT, 2020-01-15. *Blockchain Technologies*. URL: https://ec.europa.eu/digital-single-market/en/blockchain-technologies

[22] URL: https://www.eublockchainforum.eu/reports

3.

CHALLENGES FOR THE EU LEGISLATION AND BLOCKCHAIN

3. CHALLENGES FOR THE EU LEGISLATION AND BLOCKCHAIN

The EU has a well-developed legal and regulatory environment that puts it at an advantage in developing a suitable framework for blockchain technology. The previous chapter suggests a strong will from the EU to work towards a regulatory framework that will bring legal certainty to blockchain development and adoption. Notwithstanding, some fundamental areas remain in which there is little legal and regulatory clarity or unity. This raises interesting and important questions, as it may prevent blockchains from unleashing their full potential in the EU. **In the following sections, some of the main legal issues in relation to blockchain technology – based on findings in the existing literature – are summarised and discussed.**

INNOVATION NEEDS LEGAL CERTAINTY AND REGULATORY CLARITY

Legal certainty and regulation clarity are regarded as key catalysts for blockchain development, and the lack thereof as key barriers.[23] The legal and regulatory framework is especially important for decentralised technologies (such as blockchain) as no single entity is in control. Entrepreneurs will (understandably) avoid investing heavily in products only to discover later that their investment is not compliant, potentially exposing them to penalties. Similarly, consumers and end users want to understand their rights and obligations[24]. While it is possible in some cases to obtain rulings from the authorities ahead of time, the process is often slow and cumbersome – nor is it always clear if a ruling in one country or region is binding and/or legal in others.[25] In this context, it is important for regulators and innovators to work together, as well to adopt a common terminology at EU level so that everyone understands what is being discussed[26].

The *Blockchain Innovation in Europe* report[27] highlights that while there is some level of legal harmonisation, many points are of national competence. In other words, where there may be no problem at the national level, on an EU-level there might be obstacles when pushing for pan-European solutions, given the many differences between countries such as regulation of medical records. When it comes to creating clarity, the most pressing need is probably in the area of token classification. The tax and accounting treatment of cryptoassets is still rather unclear. Whether a token is regarded as a security, a financial instrument or a means of payment is central to how it is regulated, and of keen interest not just for token issuers, but also for any enterprise dealing with tokens (such as exchanges, financial advisors and brokers).[28] The issue of trading on secondary markets is also often a matter of concern, as there might be a risk of market abuse; with regards to utility tokens, there is also a risk of these being purchased as a speculative investment (which could then turn them into a security on the secondary market).[29]

THE LEGAL STATUS OF SMART CONTRACTS

Smart contract is a piece of code which is stored in the blockchain network (on each participant database). It defines the conditions on which all parties using the contract agrees, and certain actions described in the contract can be executed if the pre-defined conditions are met.[30] Smart contracts are essentially computer programs that carry out

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[23] European Commission (2020). *Study on Blockchains: Legal, Governance and Interoperability Aspects (SMART 2018/0038).* URL: https://ec.europa.eu/digital-single-market/en/news/study-blockchains-legal-governance-and-interoperability-aspects-smart-20180038

[24] EU Blockchain Observatory and Forum, 2018-12-12. Workshop Report: Legal Recognition of Blockchains & Smart Contracts. URL: https://www.eublockchainforum.eu/reports

[25] EU Blockchain Observatory and Forum (2018). *Blockchain Innovation in Europe.* URL: https://www.eublockchainforum.eu/reports

[26] EU Blockchain Observatory and Forum, 2018-12-12. Workshop Report: Legal Recognition of Blockchains & Smart Contracts. URL: https://www.eublockchainforum.eu/reports

[27] EU Blockchain Observatory and Forum (2018). *Blockchain Innovation in Europe.* URL: https://www.eublockchainforum.eu/reports

[28] EU Blockchain Observatory and Forum (2018). *Blockchain Innovation in Europe.* URL: https://www.eublockchainforum.eu/reports

[29] European Commission (2020). *Study on Blockchains: Legal, Governance and Interoperability Aspects (SMART 2018/0038).* URL: https://ec.europa.eu/digital-single-market/en/news/study-blockchains-legal-governance-and-interoperability-aspects-smart-20180038

[30] WU Global Tax Policy Center (WU GTPC) at the Institute for Austrian and International Tax Law

the terms of any agreement between parties. These agreements can be recorded and validated into a blockchain which can then execute and enforce the contract automatically, usually under 'if, then' instructions: 'if' something happens (e.g. if you rent and pay for a car and short term insurance), 'then' certain transactions or actions are done (the car door unlocks and the payment is transferred).[31]

Smart contracts can improve efficiencies in contract enforcement as well as in "e-Government" services and public and tax administration. They can also disrupt or modernise accounting and tax payments, for instance by improving tax compliance by guaranteeing real-time, automated tax payments from the taxpayer at the time of the execution of the transaction. Self-execution makes it possible for unrelated parties to transact with each other in the absence of a trusted third party that can verify the validity of transaction. For example, payroll tax can be automatically withheld and paid into the treasury at the time of salary transfer, thus removing the role of tax collector from the employer.[32]

At the same time, smart contracts also illustrate the difficulties in applying laws and regulations developed for conventional, centralised platforms and businesses to the decentralised character of blockchain. Smart contracts can be used to enshrine contractual agreements between parties in computer code, and have the advantage of being transparent and self-executing – once deployed in the blockchain, they cannot be stopped. Yet several questions remain: can code really be law? How can we enforce the stipulations of a smart contract on a blockchain with its real-life counterparts? To what extent will smart contracts be binding? How do we manage litigation and appeals for automated, self-executing agreements? Several studies – including a recent study on the legal, governance and interoperability aspects of blockchain – provide analysis on different scenarios in building an EU legal framework for developing and deploying blockchain.[33] There are also questions surrounding decentralised autonomous organisations (DAOs), for instance whether they need a new type of legal identity, and what jurisdictions apply if the location of all participants is unknown.[34]

Contract law applies to smart contracts if they indeed qualify as legal contracts. Smart contracts' cross-border dimensions can complicate matters in practice, for instance when there are national legal requirements on the need for a written form of the contract. Automated transactions characterised by high complexity can also be problematic as non-experts cannot grasp what the smart contract does at a technical level.[35]

However, smart contracts also present opportunities from a consumer protection perspective. Pseudonymity presents legal advantages (e.g. data protection) as well as disadvantages (e.g. anti-money Laundering). Moreover, while blockchains are useful to coordinate actions between different actors located in various locations, it raises questions of applicable law and jurisdiction. The question is not *whether* smart contracts are subject to the law, but rather to *which* law they are subject. There is also the issue of the capacity to contract and the protection of minors; for instance, if one cannot know whether a party lacks capacity or if a minor is involved, it would be impossible to determine whether they have capacity to engage in the contract.[36]

There is also the matter of opacity, and how parties without the necessary technical expertise can negotiate, draft and adjudicate smart contracts. Whereas smart contracts by no means always qualify as legal contracts, they *can* in cases where they meet the relevant definition of a valid contract in national legislation.[37] As for the disadvantages that opacity may create for consumers, existing supranational secondary legislation already seems to contain

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of Vienna University of Business and Economics (2017). Blockchain 101 for governments. URL: https://www.un.org/esa/ffd/wp-content/uploads/2017/10/15STM_Blockchain-101.pdf.

[31] Nascimento S., Pólvora A. , Sousa Lourenço J (2018). *Blockchain4EU: Blockchain for Industrial Transformations*. Publications Office of the European Union, Luxembourg, 2018. URL: https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/blockchain4eu-blockchain-industrial-transformations

[32] WU Global Tax Policy Center (WU GTPC) at the Institute for Austrian and International Tax Law
of Vienna University of Business and Economics (2017). Blockchain 101 for governments. URL: https://www.un.org/esa/ffd/wp-content/uploads/2017/10/15STM_Blockchain-101.pdf.

[33] European Commission (2020). *Study on Blockchains: Legal, Governance and Interoperability Aspects (SMART 2018/0038)*. URL: https://ec.europa.eu/digital-single-market/en/news/study-blockchains-legal-governance-and-interoperability-aspects-smart-20180038

[34] EU Blockchain Observatory and Forum, 2018-12-12. Workshop Report: Legal Recognition of Blockchains & Smart Contracts. URL: https://www.eublockchainforum.eu/reports

[35] European Commission (2020). *Study on Blockchains: Legal, Governance and Interoperability Aspects (SMART 2018/0038)*. URL: https://ec.europa.eu/digital-single-market/en/news/study-blockchains-legal-governance-and-interoperability-aspects-smart-20180038

[36] European Commission (2020). *Study on Blockchains: Legal, Governance and Interoperability Aspects (SMART 2018/0038)*. URL: https://ec.europa.eu/digital-single-market/en/news/study-blockchains-legal-governance-and-interoperability-aspects-smart-20180038

[37] European Commission (2020). *Study on Blockchains: Legal, Governance and Interoperability Aspects (SMART 2018/0038)*. URL: https://ec.europa.eu/digital-single-market/en/news/study-blockchains-legal-governance-and-interoperability-aspects-smart-20180038

mechanisms to address this. Nevertheless, the question of how to make electronic contracts in general – and smart contracts in particular – more transparent and user-friendly is one of general importance in the Digital Single Market.[38]

CASE 1: ITALY

After joining the Blockchain Partnership and setting up a task force dedicated to digital innovation, **Italy** enacted a set of rules establishing an overarching legal foundation for the validity and enforceability of DLTs and smart contracts.

On February 7, 2019, the Italian Parliament approved a law aimed at simplifying and improving public administration and enterprises' operations. This law introduces, among others, a legal definition of both DLTs and smart contracts and recognizes their full legal validity and enforceability in Italy. As a result, Italy is one of the first countries to introduce an overarching set of rules on DLTs and smart contracts generally applicable to all types of transactions, regardless of business sector.

The newly enacted law specifically defines DLTs as those technologies and IT protocols based on a shared, distributed, replicable, simultaneously accessible, structurally decentralized ledger, built on cryptographic keys which enable the registration, validation, update and storage of either decrypted or encrypted data, verifiable by each participant and that cannot be altered nor modified. This definition is along the lines of the principles set out in the advice rendered by EU regulatory bodies.

The Agency for Digital Italy has set the technical standards for DLTs suitable for producing the same legal effect of an electronic timestamp pursuant to EU Regulation 910/2014 (or, the eIDAS Regulation) in respect of any digital document stored thereon. In other words, this will entail the presumption of the accuracy of the date and the time it indicates and the integrity of the data to which the date and time are bound.

In the new law, smart contracts are defined as software based on DLTs which, once the relevant ledger entry has been validated, automatically give effect to the relevant terms agreed between two or more parties. Smart contracts are deemed by law to be equivalent for certain purposes (i.e., consensus formation and evidentiary value) to traditional written contracts to the extent that the digital authentication of the parties is made in accordance with the procedure to be established by AgID.

The new legal framework confirms the Italian legislature's trust in digital innovation as a way to simplify processes and improve the economy. Italian regulation also fits within the European common approach on DLTs in the international arena.

Resources:
Consensys (2019). Which governments are using blockchain right now? URL: https://consensys.net/blog/enterprise-blockchain/which-governments-are-using-blockchain-right-now/
Jones Day (2019). Blockchain and Smart Contracts: Italy First to Recognize an Overarching Legal Foundation. URL: jonesday.com/en/insights/2019/02/blockchain-and-smart-contracts-italy

THE RESPONSIBILITY FOR LEGAL COMPLIANCE AND LIABILITY

The legal system wants accountability and is designed to not allow vacuum, yet there are practical problems related to allocating liability with so many actors involved in blockchain technology. This is a tension that is yet to be resolved.[39]

Because of their decentralised nature, many blockchain projects – especially public, permissionless blockchains – are more like public infrastructure projects than private, profit-oriented endeavours. Does this mean that rules for private companies should apply to them? Public, permissionless blockchain platforms like Bitcoin or Ethereum are

[38] European Commission (2020). *Study on Blockchains: Legal, Governance and Interoperability Aspects (SMART 2018/0038).* URL: https://ec.europa.eu/digital-single-market/en/news/study-blockchains-legal-governance-and-interoperability-aspects-smart-20180038
[39] EU Blockchain Observatory and Forum, 2018-12-12. Workshop Report: Legal Recognition of Blockchains & Smart Contracts. URL: https://www.eublockchainforum.eu/reports

maintained by their communities and are, in theory, not owned by anyone. Who then can be made responsible or considered liable if something goes wrong – and under what jurisdiction?

In terms of the responsibility for legal compliance and liability, challenges are not mainly due to any shortcomings of existing legal frameworks, but rather to the fact that blockchain systems may not have been designed with a view to complying with legal requirements in the first place.[40] In this regard, there is a contradictory element to the regulation and governance of blockchain technology by the EU, given its core principle of decentralisation. Its decentralised nature makes blockchain especially interesting and applicable in contexts where levels of trust in central authorities are low, or where trust and acceptance need to be established between two parties without the involvement of a third party.

PRIVACY AND TRANSPARENCY

The trade-off between transparency and privacy remains one of the most disputed issues in the blockchain space. Blockchain ensures transactions are visible to all and indisputably authenticated by unique keys or credentials, which can become problematic when it comes to the protection of personal, sensitive or confidential data. It is also one of the main distinctions for companies or organisations when choosing between public and private blockchains. The transparency and immutability of data on the blockchain might be a matter of concern when certain information is not meant to be publicly available, or needs to be altered due to errors, inaccuracies or other problems in data entry. Many companies are therefore more inclined towards permissioned blockchains in which distinct layers of access to data can be configured to only allow access to specific participants and/or specific points in time. It also allows for different disclosures of data, ranging from completely public records to restricted access and private information only visible to one participant.[41] The occasional preference of permissioned blockchains is interesting and paradoxical, as it challenges the perceived benefits (transparency and immutability) of public blockchains.

With regards to privacy, contrary to common misconception, public, permissionless blockchains are not anonymous but rather *pseudonymous*. For instance, Bitcoin transactions are not tied to real identities (anyone can transfer Bitcoin to others through private keys with no personal information) and are randomly transmitted over the peer-to-peer network, but it is possible to deanonymize transactions using different techniques. Research has shown that it is possible in over 60 percent of cases to link an individual's personally identifiable information to Bitcoin addresses used for ordinary purchases in major online merchants. Research and ongoing experiments are attempting to tackle privacy concerns by using cryptographic protocols such as zero-knowledge proofs.[42]

Privacy risks related to blockchain technologies will require continuous attention. Even if governments could deploy blockchains that share data across public networks, they would still need to ensure that current and future encryption methods are strong and reliable enough to ensure user privacy.[43]

GDPR AND DATA PROTECTION

The challenge of reconciling Europe's new General Data Protection Regulation (GDPR) with blockchain is a Europe-specific regulatory issue with significant implications for blockchain in the EU. GDPR is a comprehensive update to Europe's data protection regulations with the dual objective of protecting the data rights of individuals and facilitating the free movement of personal data in the EU.

The law was conceived and written before blockchain technology was widely known, meaning it was (understandably) designed with an implicit assumption that a database is a centralised mechanism for collecting, storing and processing data. However, as has become clear over time, many of GDPR's stipulations appear to clash with blockchain's decentralised approach[44]:

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[40] European Commission (2020). *Study on Blockchains: Legal, Governance and Interoperability Aspects (SMART 2018/0038).* URL: https://ec.europa.eu/digital-single-market/en/news/study-blockchains-legal-governance-and-interoperability-aspects-smart-20180038

[41] Nascimento S., Pólvora A. , Sousa Lourenço J (2018). *Blockchain4EU: Blockchain for Industrial Transformations.* Publications Office of the European Union, Luxembourg, 2018. URL: https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/blockchain4eu-blockchain-industrial-transformations

[42] Nascimento S., Pólvora A. , Sousa Lourenço J (2018). *Blockchain4EU: Blockchain for Industrial Transformations.* Publications Office of the European Union, Luxembourg, 2018. URL: https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/blockchain4eu-blockchain-industrial-transformations

[43] McKinsey & Company (2017). *Using blockchain to improve data management in the public sector.* URL: https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/using-blockchain-to-improve-data-management-in-the-public-sector

[44] EU Blockchain Observatory and Forum (2018). *Blockchain Innovation in Europe.* URL: https://www.eublockchainforum.eu/reports

- The most obvious and lively debated point of tension is the fact that blockchains are constantly growing databases, to which information can only be added and not removed. GDPR, on the other hand, gives individuals the right to have their data amended to ensure it remains accurate, or erased when no longer needed. In other words, GDPR is rooted in the assumption that data can be modified or erased where necessary to comply with legal requirements, while blockchain makes the unilateral modification of data purposefully cumbersome in order to ensure data integrity and to increase trust in the network.[45]
- In a public, permissionless blockchain, where all full nodes on the network process the information, it can be difficult to identify what GDPR calls the 'data controller', meaning the person or entity with ultimate responsibility for how the data is used. Identifying such an entity is a key requirement of GDPR. While the GDPR is based on an underlying assumption that in relation to each personal data point there is at least one the data controller, blockchains make the allocation of responsibility and accountability burdensome.[46]
- GDPR stipulates that data can only be transferred to third parties outside the EU if the location offers equivalent levels of protection as those found in Europe. In many permissionless blockchains – which are open to anyone regardless of location, and in which a full copy of the database is replicated on all the full nodes participating in the network – it is not possible to selectively limit where the data goes.
- This replication of the full data set throughout the network also appears to clash with GDPR's stipulation that applications and businesses only process as much data as needed for a specific transaction. GDPR gives individuals protection from having their personal data automatically processed, whereas blockchains generally – and smart contracts in particular – automatically process information by design.

CASE 2: THE NETHERLANDS

How can government agencies exchange information that helps vulnerable citizens, whilst still complying with GDPR legislation?

In **the Netherlands,** CJIB (Central Judicial Collection Agency) has launched an app ('The Financial Emergency Brake') which provides citizens with a GDPR-proof way to declare payment inability. The idea is to help people avoid or getting out of debt, as well as distinguishing between those who want to pay but can't, and those in debt who are able to pay but won't. The app uses an algorithm that predicts whether someone is at risk of going into debt or being in debt. Timely identification of debt can prevent debt from worsening.

The CJIB wanted to "GDPR-proof" their solution by allowing participating organisations to exchange information in a safe and legal manner, while maximising citizen control over the data. Technology should be a means to an end, not an end in itself. Blockchain was chosen as no single partner has control over all data – it helps citizens control their data in a secure and private way, and the system is more stable as it has multiple databases instead of a single point of failure.

Resources:
CJIB (Central Judicial Collection Agency in The Netherlands) (2019). The Financial Emergency Brake. URL: https://northsearegion.eu/bling/news/cjib-publication-the-financial-emergency-brake/

Many see these tensions as irreconcilable, and some even claim blockchain technology to be a threat to data protection. Reconciling GDPR and blockchain will therefore be a challenge not only for lawmakers, but also for entrepreneurs and those building blockchain-based platforms and applications in Europe; as long as the legal framework around personal data and blockchain remains unclear, these actors face legal uncertainty which is a significant barrier to innovation.[47]

The lack of legal certainty with respect to certain aspects of the GDPR therefore appears to be one of the EU's biggest challenges relating to blockchain. However, there are points of optimism as well. Both GDPR and blockchain share the objective of data sovereignty, so blockchain could become a means to achieve this end. Blockchain is also not yet a mature technology, meaning it may be possible to make the technology GDPR-compliant as it evolves. In theory, blockchain could make it easier for platforms and applications to have this compliance integrated in the code, thereby supporting data protection by design.[48]

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[45] Panel for the Future of Science and Technology (STOA) (2019). *Blockchain and the General Data Protection Regulation.* URL: https://www.europarl.europa.eu/stoa/en/document/EPRS_STU(2019)634445
[46] Panel for the Future of Science and Technology (STOA) (2019). *Blockchain and the General Data Protection Regulation.* URL: https://www.europarl.europa.eu/stoa/en/document/EPRS_STU(2019)634445
[47] EU Blockchain Observatory and Forum (2018). *Blockchain Innovation in Europe.* URL: https://www.eublockchainforum.eu/reports
[48] EU Blockchain Observatory and Forum (2018). *Blockchain Innovation in Europe.* URL: https://www.eublockchainforum.eu/reports

EIDAS (ELECTRONIC IDENTIFICATION, AUTHENTICATION AND TRUST SERVICES REGULATION)

Some of the prerequisites for blockchains acquiring legal status would be the legal recognition of blockchain-based signatures (who did the transaction), timestamps (when it was carried out), validations (who validated the transactions) and "documents" (the data associated with a transaction or contract). In Europe, such issues are handled under the electronic IDentification, Authentication and Trust Services regulation (eIDAS), which intersects with blockchain in different ways. For example, according to eIDAS, digital documents cannot be denied legal force simply because of their electronic nature, which supports the potential for legal standing for the data contained in a blockchain-based registry or contract.[49]

The situation is more complex when it comes to eSignatures and eSeals (signatures of a legal entity as opposed to a natural person). eIDAS recognises three different levels of eSignatures: simple, advanced and qualified. Blockchains would appear to meet the technical criteria for the first two, but they need to meet the highest standard to be legally binding. That requires using the services of a recognised Trust Service Provider (TSP), or undergoing the onerous process of becoming a recognised TSP yourself. Therefore, from an eIDAS perspective, blockchain transactions do not have legal authority by themselves. There are related issues with timestamps. Today, there is no timestamping service using blockchain that is being used by a TSP, but this can change. As authorities, including regulators and the courts, become more aware and knowledgeable about blockchain, they will likely be in a better position to evaluate whether blockchain-based timestamping solutions can qualify under the eIDAS framework.[50]

[49] EU Blockchain Observatory and Forum (2019). *Legal and Regulatory Framework of Blockchains and Smart Contracts.* URL: https://www.eublockchainforum.eu/reports

[50] EU Blockchain Observatory and Forum (2019). *Legal and Regulatory Framework of Blockchains and Smart Contracts.* URL: https://www.eublockchainforum.eu/reports

CASE 3: ESTONIA

Estonia experienced a nationwide cyberattack in 2007, an event which played a critical role in advancing the country's eGovernment efforts through providing a secure non-corruptible blockchain-based electronic personal identity key. Estonia was the first country to use blockchain on a national level. Since 2012, blockchain has been in operational use in Estonia's registries, including judicial, national health, and commercial code systems. The Estonian government has plans to extend DLT use to other spheres, such as personal medicine, cybersecurity, and data embassies. The government-created e-Estonia program boasts 99% of services held online. 44% of Estonians use online voting, 98% of tax declarations are filed online, and 98% of Estonians have a digital ID. 99% of health data is digitized and stored on a blockchain.

The Estonian Ministry of Justice leveraged blockchain technology to create the e-Law system, an online database that allows the public to read every draft law submitted since February 2003.

Resources:
Consensys (2019). Which governments are using blockchain right now? URL: https://consensys.net/blog/enterprise-blockchain/which-governments-are-using-blockchain-right-now/
E-Residency Blog (2017). Welcome to the blockchain nation. URL: https://medium.com/e-residency-blog/welcome-to-the-blockchain-nation-5d9b46c06fd4
E-Estonia (2020). URL: https://e-estonia.com

TENSION BETWEEN BLOCKCHAIN REALITY AND LEGAL REALITY

The tension between blockchain reality and legal reality as a "technical design vs human governance" issue is not unique to blockchains. For instance, there may be situations where from a legal perspective, ownership changes, yet this is not reflected on-chain. The *Study on Blockchains: legal, governance and interoperability aspects* report encourages the development of technical and governance solutions that are aimed at aligning on-chain and off-chain information (such as guidance on best practices), as well as recommending that the EU provides research funding for projects seeking to address such issues. These issues are of broader relevance for the whole digital economy.[51]

THE PROTECTION OF FUNDAMENTAL LEGAL PRINCIPLES AND MANDATORY RULES

There is also the risk of blockchain and DLT being used to infringe fundamental legal principles or mandatory rules (such as the prohibition of child abuse materials, drug trafficking or money laundering), and it can be difficult to remove such content from the database. However, existing EU principles appear well-suited to addressing problems associated with the criminal use of this technology.[52]

CHALLENGES FOR IT DECISION-MAKERS

The rapid growth of blockchain technology presents challenges for IT decision-makers in government. For instance, there are no widely accepted standards for blockchain technologies or the networks that operate them. Like everyone else, public sector IT organisations may encounter difficulties when assessing the quality of available solutions and determining how to integrate these as seamlessly as possible within existing legacy systems. In addition, because many blockchain providers are small start-ups, it may be difficult for IT and procurement departments to identify partners and companies that can offer both cutting-edge products *and* stability in terms of being able to see projects through to implementation.

There are ways to benefit from innovation in the blockchain ecosystem while adequately managing risks. An approach suggested in a McKinsey & Company report is to adopt an incubator approach to change. For example, one can establish a small team that scans and prioritises opportunities for blockchain pilots, followed by selecting suitable partners for implementation. This group could be within a government's central digitization office or within the individual authorities that stand to benefit most from blockchain deployment.[53]

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[51] European Commission (2020). *Study on Blockchains: Legal, Governance and Interoperability Aspects (SMART 2018/0038)*. URL: https://ec.europa.eu/digital-single-market/en/news/study-blockchains-legal-governance-and-interoperability-aspects-smart-20180038
[52] European Commission (2020). *Study on Blockchains: Legal, Governance and Interoperability Aspects (SMART 2018/0038)*. URL: https://ec.europa.eu/digital-single-market/en/news/study-blockchains-legal-governance-and-interoperability-aspects-smart-20180038
[53] McKinsey & Company (2017). *Using blockchain to improve data management in the public sector*. URL: https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/using-blockchain-to-improve-data-management-in-the-public-sector

4.

CONCLUSIONS AND RECOMMENDATIONS

4. CONCLUSIONS AND RECOMMENDATIONS

Overall, current research does not provide clear-cut answers to the question of what we *can* and *cannot do*. Most of the literature highlights the benefits (and limitations) of using blockchain technology, but the legal questions – especially connected to the public sector – will likely need to be specifically addressed and/or defined – both on national and EU-level. Regulation and further development in the EU will occur if there is political will; in this regard, it could be useful to understand the political agenda of the presidency of the European Council in the coming years.

The use of blockchain technology in the public sector certainly has the potential to increase levels of trust and transparency, but innovation also requires additional legal certainty. One of the main obstacles for blockchain technology in the public sector is the need to change or adapt existing legal frameworks, both EU-wise and Member State-specific alike. The status of regulation in the EU differs between Member States, and the question is of course whether this differentiated regulatory landscape will be enough, or whether we will need extensive and specific regulation on blockchain technology. Because blockchain technology impacts different legal areas and therefore cannot be regulated by a single specific law, the answer is not straightforward, and many of the European cases are still in their infancy – the industry is still nascent, and so is the regulatory response. The fact that technology and social change always comes first, followed by law, is illustrated by *Ubi societas, ibi jus* – wherever there is society, there is law. As legislation "plays catch-up", innovation and technological advancement is often followed by a period of uncertainty.

As aforementioned, while GDPR was designed for centralised organizations managing personal data, the decentralised concept of blockchains clashes with this principle. However, technology may also empower individuals to act as data sovereigns that can themselves exercise control of their data without an intermediary. As blockchain technology develops, regulators will most likely need to ensure that the technology evolves in a normatively desirable manner without hindering innovation and progress, meaning all parties – ranging from industry to policymakers – must be involved in discussions, learning, and research.

Blockchain technology arose to overcome the lack of trust in central authorities (which is not necessarily the case across the EU), promising efficiency and increased levels of trust without intermediaries. The removal of intermediaries can of course represent a risk since intermediaries are intended to bring legal safety, yet sometimes they are the very cause of increased complexity and costs. Understanding the difference can be challenging, and the role of the regulatory bodies is to ensure that the technology is designed to comply with legal norms. However, as previously mentioned in this report, there are contradictions in that blockchain systems may not have been designed with a view to comply with legal requirements in the first place. Would it therefore be contradictory to adapt GDPR to blockchain technology and integrate blockchain into "mainstream" practices? As always, while there are no straightforward answers to this question, we know that legislation and technology have always evolved together, sometimes with tension and other times in symbiosis.

This report has therefore showcased the multifaceted nature of the relationship between law and technological innovation. Provided that innovators are given the necessary flexibility, blockchain can spur innovation and increase levels of trust between citizens and the public sector, yet it also needs to be compliant with legal requirements and public policy objectives. New technology not only changes the way we apply existing regulation – decentralised structures also challenge the core regulatory architecture.

Finally, it is impossible to discuss future scenarios without taking the ongoing COVID-19 pandemic into account. The International Association for Trusted Blockchain Applications (INATBA) has launched a COVID Task Force, a global consortium of public and private parties activating blockchain-based solutions to address challenges to global systems and services caused by the COVID-19 pandemic. COVID-19 has also sped up the process of digitalising certain parts of public administration. In this regard, the pandemic could be an opportunity to leverage the advantages of blockchain technology, ensuring trust and interoperability.

Another relevant use case is the tracing and management of sensitive healthcare data using blockchain. In an effort to crowdsource information about the movement of COVID-19, a region-wide Ethereum project in Latin America and the Caribbean released DAVID19, a platform designed to help citizens work together to create a real-time, interactive tracking map to mitigate the spread of the virus and coordinate progressive deconfinement. The DAVID19 platform uses advanced privacy features so that citizens can anonymously share personal data and safely aggregate information about the health status of people across the region.

It is not unlikely that the pandemic will derail or delay the development of a coherent policy, legal and regulatory framework for blockchain technology in the EU. COVID-19 might also negatively affect the ability and willingness of the public sector to invest in innovation and new technology. At the same time, this could also be a better time than ever to invest in "the new normal". Some argue that the COVID-19 crisis has revealed a general lack of connectivity and data exchange built into our global supply chains, and that future resilience will depend on transparent, interoperable and connective networks.

5.

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