(Intellectual) Property Rights on Cryptocurrency

A comparison between the legal situation in South Africa and Germany

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DECLARATION

I hereby declare that I have read and understood the regulations governing the submission of LLM in Intellectual Property Law dissertations, including those relating to length and plagiarism, as contained in the rules of this University, and that this dissertation conforms to those regulation.

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ABSTRACT

In contrast to other applications that use blockchain (such as non-fungible tokens/NFTs or smart contracts, which I will not discuss), cryptocurrencies are the most widespread in society - and are already official currency in El Salvador, for example. Due to this new type of technology (blockchain), cryptocurrencies can hardly be categorised in existing legal categories. This is why it is also difficult to establish rights to cryptocurrencies. I would like to address this problem in my master's thesis: What (intellectual) property rights can there be to cryptocurrencies?

Such rights could be necessary to protect the holder of cryptocurrencies. I will focus on two categories of rights in particular: Intellectual property rights and the private law understanding of property (which is usually on tangible things).

At the beginning, I shed light on the technical background of cryptocurrencies and blockchain technology, explain the most important terms and present an example transaction.

I then turn to the common generic term of intellectual property rights and private law property: property. First, I examine what is meant by property - first on a philosophical level, then on to the constitutional understanding and individual areas of law in South Africa and Germany. It is noticeable that there are already regulations on cryptocurrencies in some selected areas - but these do not necessarily allow any conclusions to be drawn as to whether (intellectual) property rights to cryptocurrencies exist.

Therefore, I analyse the existing intellectual property rights (including copyright and database right) and also discuss a possible *sui generis* right to cryptocurrencies.

Furthermore, I turn to an extension of the private law understanding of property in South Africa and Germany - in particular the question of whether things that fall under the private law understanding of property must necessarily be tangible (and if it is possible to change requirements for private law property in South Africa and Germany). After all, cryptocurrencies could be similar to tangible objects rather than intangible objects.

Finally, I will briefly discuss other jurisdictions such as the USA, UK or Singapore with regard to the question of whether a (private law) property right to cryptocurrencies exists.

I then summarise my findings in a conclusion.

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A. Introduction

Cryptocurrencies can be compared (regardless of the technical side)[1] with tulips during the tulip mania in the 17th century. Back then, tulips were used as a (high-priced) means of exchange and payment.[2] Nowadays, cryptocurrencies like bitcoin are used as a modern means of payment and exchange. The difference between the two is that tulips can belong to a person by law, i.e. they can be the property of a person – mainly because there are physical/tangible objects, whereas the position relating to cryptocurrency is unclear. In other words, the main question of my work is: Is there a legal relationship between cryptocurrencies and a person in the form of a tangible or intangible property right?

The principle that certain objects are assigned to a person is as old as humanity. It was already stated in Moses' 8th commandment: "You shall not steal." To steal something from another person, the thing must belong to that person. Today, ownership in the case of tangible things usually means property. On the other hand, intangible goods (e.g. "patent, copyright, secret process or formula, goodwill, trademark, trade brand, franchise, or other like property")[3] are usually assigned by different rights. Cryptocurrencies are not tangible; therefore they can be considered as intangible goods. A major category of rights on intangible goods are intellectual property rights. Beyond the delimitation by (in)tangibility, there are considerable differences in how property and intellectual property rights are structured in individual jurisdictions. There are particularly striking differences between the regulations in (partly) common law states such as South Africa and civil law states such as Germany. Furthermore, "South Africa has experienced significant growth in cryptocurrency adoption"[4] which makes it the largest

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1 The technical side of cryptocurrencies as far as it is necessary for a legal analysis.

2 Erhan Afyoncu *Tulip mania: The 17th century bitcoin craze* (2018), available at https://www.dailysabah.com/feature/2018/03/02/tulip-mania-the-17th-century-bitcoin-craze, accessed on 3 January 2024.

3 26 USC sec865 (d)(2).

4 William Brederode *SA's crypto craze: Hundreds of billions of rands worth of digital currency have been traded* (2023), available at

cryptocurrency using country in Africa.[5] As a result, it has already implemented legislation which regulates holding and transferring cryptocurrencies[6] – but without granting an explicit right on them. Germany is in a comparable position to South Africa. In addition to its own legislation on cryptocurrency, Germany also has a significant influence on European legislation, particularly on the Markets in Crypto Assets (MiCA) regulation.[7] Because of the status as role models, I would like to use these two countries as a basis for comparison in my work.

Back to the clear delimitation by (in)tangibility: There is no explicit right on cryptocurrencies – neither in South Africa nor in Germany. To investigate the legal relationship between a person and (his/her) cryptocurrencies, I am going to explain the technical background and the most important terms and principles from the crypto world, including an example of a Bitcoin transaction. After the technical side, I analyse the history and justification of (constitutional) property rights with a focus on South Africa and Germany including a non-jurisdictional view on property where I try to show that there are a bunch of different understandings of the term property – resulting in different classifications of cryptocurrency.[8] As a third step, I discover if cryptocurrencies are covered by intellectual property rights like copyright, database producer rights, right on data, or right *sui generis*. At last, I figure out, if there is a chance that (private law) property rights (which usually apply

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https://www.news24.com/news24/tech-and-trends/news/sas-crypto-craze-hundreds-of-billions-of-rands-worth-of-digital-currency-have-been-traded-20230820, accessed on 3 January 2024.

5 Mabyanine Phiri *South Africa's Crypto Revolution: VALR and Luno Lead the Way* (2023), available at https://www.financemagnates.com/cryptocurrency/south-africas-crypto-revolution-valr-and-luno-lead-the-way/, accessed on 3 January 2024.

6 Cointelegraph *Cryptocurrency regulations in South Africa* (2023), available at https://cointelegraph.com/learn/cryptocurrency-regulations-in-south-africa, accessed on 3 January 2024.

7 Sandali Handagama *Stefan Berger: The man who made MiCA* (2023), available at https://www.coindesk.com/consensus-magazine/2023/12/04/stefan-berger-the-man-who-made-mica/, accessed on 3 January 2024.

8 Nicola Ann Harvey *The Legal Classification of Cryptocurrency in South African Law: An Argument for Classification as Currency* (2019) 28 seems rather to assume that there is a uniform concept of property, which is subject to different requirements depending on the author/court (using the example of corporeality).

to tangible objects) apply exceptionally on intangible objects like cryptocurrencies. My thesis ends with a summary of my findings and a decision as to whether intellectual property or (private law) property rights to cryptocurrencies can exist.

B. Technical background

Cryptocurrency - most people do not know what this term really means. Therefore, I start by defining the term cryptocurrency as I use it in my work.

Cryptocurrency means the digital representation of value that can be electronically transferred and stored using distributed ledger technology and originally used as a medium of exchange for goods or services.[9] Cryptocurrencies of one kind (e.g. Bitcoin or Ether) are interchangeable ("fungible") and differ in quantity. Colloquially, they are referred to as currency or payment tokens,[10] among other terms but I will call the single unit of measurement of cryptocurrencies a *coin/token* in my work.

I will not discuss non-fungible tokens (so-called NFTs) or other use cases of blockchain technology. Although NFTs pose similar problems to cryptocurrencies in terms of (intellectual) property rights, cryptocurrencies and NFTs differ too much in their technical structure (in particular the [non-]fungibility) to be dealt with together.

However, the definition I gave above does not explain what is behind cryptocurrency - at least not without further explanations. I try to provide these explanations in the following, so that at the end of this chapter I can use terms like cryptocurrency, blockchain, or distributed ledger technology as well as consensus, wallet, key, mining etc. in the legal analysis. For this purpose, I have built this chapter similar to a law act: At the beginning are the

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9 The definition is based on Art. 3 (1) no. 5 Markets in Crypto Assets (MiCA) Regulation (EU) 2023/1114.

10 One instead of many: Carol R Goforth *U.S. Law: Crypto is Money, Property, a Commodity, and a Security, all at the Same Time* (2018) Journal of Financial Transformation, Forthcoming.

definitions of terms. Then come the general rules and principles and finally the special part: the application using the example of a Bitcoin transaction.[11]

I. Terms of the crypto world

Many terms like Bitcoin, blockchain, DLT, wallet, etc. are used, but few know what they mean. However, to deal with these terms in more detail from a legal perspective and to classify them, one must understand what they are. In this chapter, I try to give a basic overview, as far as necessary for legal subsumption. I do not want to (and am not able to) write a technological-scientific article but only provide a legal analysis through explanations.

Terms that I would like to explain in more detail for this purpose are: Blockchain, Bitcoin/Ethereum/Monero, consensus building, mining, client, wallet, and keys.

1. Blockchain

The word blockchain first appeared in Satoshi Nakamoto's Bitcoin whitepaper (the origin of the most famous cryptocurrency, the Bitcoin). The Bitcoin whitepaper included a way to create a decentralised network (a network without a central authority) by having users take over the tasks of a central authority - the Bitcoin Blockchain.[12] Blockchain is a distributed ledger technology that logs information in chronological order and adds blocks to it.[13] The information[14] is then stored in these blocks.[15]

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11 I generally base examples in my work on bitcoin but discuss the other cryptocurrencies where they deviate relevantly from bitcoin.

12 Satoshi Nakamoto *Bitcoin: A Peer-to-Peer Electronic Cash System* (2008), available at https://bitcoin.org/bitcoin.pdf, accessed on 3 January 2024.

13 Christoph Meinel & Tatiana Gayvoronskaya *Blockchain: Hype or Innovation* (2018) 14.

14 Information means any kind of data/content, such as transaction data (which user transfers what to which user), but also links to content on servers (as is mostly the case with non-fungible tokens), etc.

15 Horst Treiblmaier & Trevor Clohessy *Blockchain and Distributed Ledger Technology Use Cases – Applications and Lessons Learned* (2020) 5.

With this definition, it is not possible to understand the technology (at least for me) or even to consider it under legal terms. To understand what blockchain technology all is about, it is worth looking at more familiar systems and identifying similarities as well as differences - such as the World Wide Web (WWW).[16] The WWW is a centralised network based on a so-called client-server structure. This means that user (as clients) simply enter an Internet address (URL) in a web browser such as Firefox, Google Chrome or Microsoft Edge in order to access a certain website. The internet address is like a location – it says which server the user wants to access - namely the server where the website (or the code behind it) is stored. All users thus access the central instances (the servers) on which the information is stored.

It is different with blockchain technology: All information is stored in blocks which are connected to each other via chains (which is why it is called blockchain). There are no central instances/servers on which information is stored. The information is stored in the blocks of the blockchain and these in turn are stored with the users or more precisely on their local hard drives.[17] The users then do not access any central servers but rather the blocks of the blockchain that they have stored on their own computer. Or in other words: The users are also the servers (peer-to-peer network).[18]

Users are called nodes, peers or miners in the blockchain context and they act among themselves to ensure that the blockchains of all users are complete and correct.[19]

a) Block

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16 Andreas M Antonopoulos *Das Internet des Geldes* (2019) 30.

17 Users differ among themselves as to whether they store the entire information of a blockchain (e.g. the entire Bitcoin blockchain) (so-called full nodes) or not (so-called nodes), see Andreas M Antonopoulos *Mastering Bitcoin: Programming the Open Blockchain 2/e* (2017) 43.

18 Alexandra Spiegel *Blockchain-basiertes virtuelles Geld* (2020) 6.

19 Christoph Meinel & Tatiana Gayvoronskaya *Blockchain: Hype or Innovation* (2018) 16.

The (data) blocks contain information, in the Bitcoin blockchain for example all transactions (one block each for transactions of approx. 10 minutes). In the Bitcoin blockchain, a new block is therefore created approximately every 10 minutes. Mining refers to the process in which a new block is created.

b) Chain

These (data) blocks are all connected to each other by means of a chain. The chain is a hash function/hash key[20] that links the blocks together. Hash functions are a type of encryption/cryptography – hence the name cryptocurrency. Hash functions reduce sequences of digits of any size (e.g. transactions in the blocks) to a sequence of digits of a fixed size – the so-called hash value.[21] This fixed size is 64 digits for Bitcoin (hash function SHA-256). This means that any information can be stored in 64 digits.[22] An hash value would be e1e908ec1e7bf32b5f7208db1e32e6e432f5d04981cfd1239930e8171f90d3e3.[23]

This hash function also ensures that no person can subsequently change information. Once the information within a block has been hashed to the 64-digit hash value using a hash function, it is no longer possible to connect the hash value to other information - that is why the information in the block (on which the hash value is based) can no longer be changed. This is called one-way or asymmetric encryption.[24] Since each block also contains a hash value of the previous block, a blockchain becomes more tamper-proof the larger it is.[25]

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20 Tiana Laurence *Blockchain for Dummies 2/e* (2019) 3.

21 Johannes Arndt *Bitcoin Eigentum* (2021) 221.

22 Satoshi Nakamoto *Bitcoin: A Peer-to-Peer Electronic Cash System* (2008), available at https://bitcoin.org/bitcoin.pdf, accessed on 3 January 2024.

23 It is the hash value of a randomly selected transaction, available at https://bit.ly/3pAryBn, accessed on 3 January 2024.

24 Johannes Arndt *Bitcoin Eigentum* (2021) 221.

25 Michael Schmidt *Kryptowährung, Bitcoin und Co: Digitale Währungen - technische und steuerliche Hintergründe* (2018) 18.

c) Decentralised

One problem seems obvious: If each user has their own collection of information stored (locally) in the form of the blockchain, how can all collections be uniform?[26] In centralised networks, there is only one storage space, only one collection of information. In the blockchain network, there are multiple locations, multiple collections, but they all have to be identical. The solution is an algorithm that ensures that the information stored locally with the users matches the information stored with other users.[27] If the information is matched and discrepancies occur, that discrepancy means the relevant information is exposed as false.[28] In this way, the blockchain itself ensures that it is correct and up-to-date.

2. Bitcoin, Etherum, Monero

Bitcoin, Etherum and Monero refer to different cryptocurrency blockchains. The influence cryptocurrencies already have is particularly evident with Bitcoin: Tesla accepted Bitcoin as a means of payment for its cars[29] and El Salvador has even implemented Bitcoin as a state currency[30]. Bitcoin is thus not only the first,[31] but also the best-known cryptocurrency. From its naming also follows the biggest misconception about cryptocurrencies - that it is a (bit)coin, i.e. a virtual coin. This coin would then be transferred from person to person. But the reality does not reflect this.[32] There is nothing that the users transfer, except information about the (current and previous) transfer(s)

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26 This question is part of the well-known "*double-spending*" problem, according to which digital means of payment must ensure that each payment value (e.g. each Bitcoin) can only be spent/exist once.

27 Tiana Laurence *Blockchain for Dummies 2/e* (2019) 3.

28 False here cannot be understood as deviating from the actual facts. Instead, false means that the majority of users assume a different level of information.

29 Reuters *Autobauer Tesla akzeptiert Bitcoins als Zahlungsmittel (2021)*, available at https://bit.ly/3W7e9fh, accessed on 3 January 2024.

30 Benjamin Daniel *El Salvadors Präsident zockt mit seinem Land* (2022), available at https://bit.ly/3FJei32, accessed on 3 January 2024.

31 Satoshi Nakamoto *Bitcoin: A Peer-to-Peer Electronic Cash System* (2008), available at https://bitcoin.org/bitcoin.pdf, accessed on 3 January 2024.

32 Andreas M Antonopoulos *Mastering Bitcoin: Programming the Open Blockchain 2/e* (2017) 30.

themselves. In detail, it is as follows: From a technical perspective, cryptocurrencies are certain information in the blockchain.[33] This information includes, among other things, the past transactions up to the current (authorised) owner (so-called transaction history) of the (undefined) nothing, i.e. which sender transfers how many somethings (cryptocurrency) to which recipient and which user holds the something (cryptocurrency) at the end.

But one must not fall prey to the (obvious) misunderstanding that the (undefined) nothing would be a coin, a file, a picture or the like - because there is no (undefined) nothing. Imagine a land register that states which person has property of which piece of land - except that the land does not exist. If you now give this land register entry regarding a non-existent piece of land a value (i.e. someone pays money for the land register entry), you have the same basic principle as with cryptocurrencies. The cryptocurrency is not what you transfer but it is information that you have made a transfer. This information (including the transfers) is the simplified cryptocurrency.

No one sends this information either. Users don't transfer cryptocurrencies like files that you send as an attachment to an email or copy onto a USB stick, or a coin that you hand over. Users transfer cryptocurrencies by changing the underlying information. Like a Word document whose content is that an (undefined) nothing first belongs to A, then user A transfers the nothing to user B, user B to user C, and so on. No user sends the document, instead the document says which user owns the nothing. Again, it is similar to a land register where property of land is transferred by changing the land register.

How exactly it happens when a user transfers bitcoins to another user is explained in more detail in B.III.

3. Consensus

Information is stored in the blocks. But how does the information get into the blocks (and thus into the blockchain)? To explain this, I go back to the Bitcoin

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[33] Tiana Laurence *Blockchain for Dummies 2/e* (2019) 3.

blockchain. When A wants to transfer Bitcoins to B, he specifies various information that is stored in the block: The number of Bitcoins, (Bitcoin) addresses of A and B, from whom A got the Bitcoins (e.g. C), etc.

At first, this information is stored temporarily outside the blocks. Then, however, the technology must ensure that this information is also correct before it is stored in the blocks, in particular if A holds enough Bitcoins to transfer them to B. For comparison: When A transfers (book) money to B, A's financial institution checks, among other things, whether A has enough money in his account. However, there is no central authority like a financial institution on the Bitcoin blockchain. So, the users themselves have to check whether the information is correct (validation) and included in the blockchain. I would like to discuss two well-known examples of such validation/consensus mechanisms below: Proof-of-Work (PoW) and Proof-of-Stake (PoS).

a) Proof-of-Work (PoW)

Users of a blockchain network (e.g. the Bitcoin blockchain) are supposed to confirm that the information (e.g. transactions) is correct before it is entered into a block. Usually, only one user, a so-called miner, confirms this correctness (mining). Which miner confirms depends on who solves a calculation task first. The task consists of creating a (64-digit) hash value with certain attributes.[34] By solving the task (proof of work), the first miner has created a new block – and thus added the information to the blockchain. The idea behind this is that a person who puts so much effort into the blockchain network is also interested in the network acting with correct information. The new version of the blockchain is then sent to all users of the blockchain, verified by them and adopted so that everyone has a uniform data set again.

b) Proof-of-Stake (PoS)

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[34] Johannes Arndt *Bitcoin Eigentum* (2021) 222.

PoS is another consensus mechanism that Ethereum 2.0 will use.[35] Here, it is not the user who validates the information, having previously solved an calculation task. Users validate information and add it to the blockchain depending on their share of the blockchain by value. If a user holds 10% of all Ether 2.0, then they can also validate 10% of all incoming information.[36] The idea behind this is that users want the blockchain to contain correct data the larger their own share of the data is.

In contrast to PoW, PoS does not depend on the available computing power, but on the user's own share of the blockchain.

4. Mining

Above I briefly explained that the PoW mechanism requires so-called miners who solve complex computational tasks to add information to the blockchain. But what do the miners get out of solving such tasks? They receive a reward: (Newly created) bitcoins and the sender's transaction fees/fees. However, there are fewer and fewer newly created bitcoins per task solved - one of the purposes of this is to ensure that there are never more than 21 million bitcoins.[37]

5. Client

All users of a blockchain are connected to each other (peer-to-peer network). They communicate with each other and (automatically) synchronise their locally stored blockchains - via a software, the so-called client.[38] Through this software, each user can create an account to participate in the blockchain

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35 Rahul Nambiapurath *What Is Ethereum 2.0?* (2023), available at https://bit.ly/3nLF8BK, accessed on 3 January 2024.

36 The example is from: CoinJournal *Proof of Work vs. Proof of Stake* (2023), available at https://bit.ly/42uTdSS, accessed on 3 January 2024.

37 Satoshi Nakamoto *Bitcoin: A Peer-to-Peer Electronic Cash System* (2008), available at https://bitcoin.org/bitcoin.pdf, accessed on 3 January 2024.

38 For Bitcoin, for example, "*Bitcoin Core*".

network – the so-called wallet.[39] In addition, each user can create a wallet in other ways, which I will discuss below.

6. Wallet and Keys

When people think of wallet, they think of the place where cryptocurrencies are stored. Above I briefly explained that each user has all cryptocurrencies stored (locally) on the blockchain and that users do not transfer cryptocurrencies by sending something (or rather nothing). The information on the blockchain records that user A sent a coin/token to user B. The place where such cryptocurrencies were stored is the location where they are stored after the transfer. The place does not change. The wallet therefore does not contain any cryptocurrencies – instead, it contains the (public) wallet address of the user (comparable to an IBAN)[40] as well as his public and private key and makes it possible to manage and transfer the cryptocurrencies. The following section explains what the keys are all about and what types of wallets there are.

a) Public and Private Key

When a user creates a wallet, a file called wallet.dat is saved on his computer. This file contains, among other things, the public key and a private key.[41] The keys encrypt and decrypt the information transferred in the blockchain network (e.g. bitcoins) between the users or the wallet addresses belonging to the users. In a simplified way, the users need the private key to digitally sign/send the messages and the public key to receive messages/access the

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39 Merih Erdem Kütük-Markendorf *Rechtliche Einordnung von Internetwährungen im deutschen Rechtssystem am Beispiel von Bitcoin* (2019) 14.

40 Tiana Laurence *Blockchain for Dummies 2/e* (2019) 21: A Bitcoin address is between 27 and 34 characters long and starts with a 1 or a 3, depending on the format. A Bitcoin address looks like this: 1JgxpB31fKXP7ZHCHAYNRnrWtCDLZymTmT.

41 Merih Erdem Kütük-Markendorf *Rechtliche Einordnung von Internetwährungen im deutschen Rechtssystem am Beispiel von Bitcoin* (2019) 14.

recipient's wallet address.[42] It is therefore mandatory to have both keys in order to manage cryptocurrencies, for example.

b) Types of wallets

A wallet basically consists of the keys and the wallet address. There are various ways in which users can store the wallet or its contents. Two different groups of wallets can be distinguished, which in turn can be created in different ways: Non-custodial (non-managed wallets: paper/memory, hardware, software) and custodial wallets (managed wallets: web)[43]. The two wallet groups differ according to who can access the wallet: With non-custodial wallets, the user himself creates the wallet and can access it alone. With custodial wallets, a third party creates the wallet and can access it alone - the actual user usually has a transfer claim to the respective cryptocurrencies against the third party.

Below I briefly describe the different ways in which wallets can be created.

i) Paper/Memory

For paper or memory wallets, the user creates a wallet address and public and private keys online once.[44] The user writes down the created keys on paper (paper wallet) or remembers them (memory wallet).[45] When the user wants to use his wallet (e.g. transfer cryptocurrencies), he enters his (memorised or written) keys and the wallet address into a software and then logs out again.

ii) Hardware

With the hardware wallet, the keys and the wallet address are stored on an external storage medium (usually a USB stick). The user can either create a

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42 Alexandra Spiegel *Blockchain-basiertes virtuelles Geld* (2020) 14.

43 There are also web-based non-custodian wallets (e.g. eToro non-custodial web-wallet: available at https://bit.ly/3BrBBM4, accessed on 3 January 2024), which I equate with software wallets because of their similarities.

44 For example, via *bitaddress* (available at https://bit.ly/44Y1kcr, accessed on 3 January 2024).

45 Tiana Laurence *Blockchain for Dummies 2/e* (2019) 76.

wallet himself and store the data (keys and address) on an external storage medium or he buys a prefabricated storage medium where the seller has already created a wallet and stored the keys and wallet address on it.[46] When the user connects the storage device to a computer, the hardware interacts with software to allow the user to access their Wallet.

iii) Software

Each user can also manage cryptocurrencies via software. The software has various functions, including the wallet function, where the wallet file is stored locally on the user's computer and linked to the software. As a result, the wallet address and keys are stored in the software and the user can easily access them through the software.

iv) Web

The web wallet is very different from the other types of wallets (as indicated above). Here, the user neither creates the wallet himself nor knows the keys. With web wallets, the user enters a contract with an active custodian who creates the wallet. The user then creates a user account with the custodian,[47] through which the cryptocurrency on the wallet are displayed to the user (as a specific amount).
In this case, only the custodian can access the wallet; the user only has (transfer) claims against the custodian based on the contract.

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46 A well-known provider of hardware wallets is, for example, *Ledger* (available at https://bit.ly/42SK4Dy, accessed on 3 January 2024).

47 Well-known providers of web wallets are Trust Wallet (available at https://bit.ly/2DCaa6o, accessed on 3 January 2024) and Blockchain.com (available at https://bit.ly/3Obelto, accessed on 3 January 2024).

II. Principles of a blockchain-based payment method

The title chosen by Meinel, Gayvoronskaya and Schnjakin for their paper fits my next short section on the technological background in cryptocurrencies: "Blockchain: Hype or Innovation?"[48] Even after I have presented some important concepts of blockchain technology, the most important question remains unanswered: Why is there a need for cryptocurrencies? What advantages does a blockchain-based means of payment offer over existing systems? I explore these questions below by looking at four frequently mentioned characteristics: decentralisation, anonymity/pseudonymity, transparency, and tamper-resistance.

1. Decentralised

Lawyers who deal with facts and circumstances relating to cryptocurrencies often argue that applications such as cryptocurrencies are not dependent on central entities. This makes them - in contrast to centralised systems - independent of the (mis)behaviour of a single entity.[49]

The desire for decentralised financial applications was fuelled by the banking crisis in 2007 and 2008. As a reaction to this, Satoshi Nakamoto published the Bitcoin white paper in November 2008.[50] The Bitcoin was supposed to give everyone in the world access to financial services - and no longer make this dependent on the will (or location) of financial service providers.[51] This problem is rarely relevant in European countries but it does play a role in other regions of the world - where people are "160 kilometres away from the next bank branch" but "there is now a mobile phone tower".[52]

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48 Christoph Meinel & Tatiana Gayvoronskaya *Blockchain: Hype or Innovation* (2018).

49 Tiana Laurence *Blockchain for Dummies 2/e* (2019) 3.

50 Satoshi Nakamoto *Bitcoin: A Peer-to-Peer Electronic Cash System* (2008), available at https://bitcoin.org/bitcoin.pdf, accessed on 3 January 2024.

51 Andreas M Antonopoulos *Das Internet des Geldes* (2019) 46.

52 Andreas M Antonopoulos *Das Internet des Geldes* (2019) 46.

Cryptocurrencies are not dependent on central authorities. However, some users choose to have active-managing custodians handle their cryptocurrencies. In addition, most users do not acquire new cryptocurrencies originally (by mining), but via a trading platform - which thus act similarly to well-known financial institutions. Such custodians and platforms can (theoretically) also access many of their customers' wallets. This centres the cryptocurrencies and counteracts the former advantage.

2. Anonymous/pseudonym

Users act in blockchain networks under their wallet address. This address is the pseudonym of the respective user.[53] Each user can have as many wallets and addresses as he/she wants. To create them, he/she does not have to reveal his name, address, or anything else.[54] If you want to identify a user, you have to establish a personal reference via the IP address of the devices a user used. This more difficult identification makes cryptocurrencies popular in the criminal milieu.[55] However, there are special providers who offer de-pseudonymisation.[56]

It is more difficult with so-called private coins such as Monero: These cryptocurrencies can (so far) even be transferred anonymously from user to user. However, this only applies until someone enables de-anonymisation - as happened with Monero.[57]

These examples show that cryptocurrencies can be used pseudonymously/anonymously - although this is not an unbreakable rule.

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53 Alexandra Spiegel *Blockchain-basiertes virtuelles Geld* (2020) 14.

54 Tiana Laurence *Blockchain for Dummies 2/e* (2019) 69.

55 Hannah Knuth & Jens Tönnesmann *Beste Grüße aus Sizilien!* (2021), available at https://bit.ly/3o1xUcQ, accessed on 3 January 2024.

56 For example, glassnode (http://bit.ly/478S2eB).

57 CipherTrace *CipherTrace Announces World's First Monero Tracing Capabilities for Law Enforcement, Government, and Virtual Asset Service Providers* (2020), available at https://bit.ly/3sxKVts, accessed on 3 January 2024, CipherTrace worked together with the Department of Homeland Security (DEH) in the USA.

3. Transparent

Most cryptocurrencies are stored in public blockchains.[58] This means that any user can see all the information (including transactions) that has ever been stored in the blockchain system. In the Bitcoin blockchain, for example, the information about who received how many Bitcoins from whom and when is public, and thus the account balance and all transactions of an address are traceable. All that is needed is the wallet address.[59]

4. Tamper-proof

A frequently encountered opinion is that cryptocurrencies are tamper-proof because they function decentrally and independently of individual entities. However, even with cryptocurrencies there is no absolute protection against manipulation: So-called 51% attacks are possible. Simplified, a user who controls the majority of the hashrate of a blockchain network (i.e. who has a lot of computing power) can issue a cryptocurrency twice: Once to the recipient as the desired result of a transaction and once to himself or an initiated third party.[60] Nowadays, immense computing power would be required to carry out a 51% attack on, for example, the Bitcoin network, making such an attack unlikely.[61] However, this was not always the case - and need not always remain so: The Bitcoin Gold network, for example, was the victim of a 51% attack in 2020.[62] And even today, it is not impossible that organisations with very large resources[63] or new developments such as

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58 For example, Bitcoin und Ethereum, whereas for private blockchain: Monero.

59 Christoph Meinel & Tatiana Gayvoronskaya *Blockchain: Hype or Innovation* (2018) 20.

60 Saifedean Ammous *Der Bitcoin-Standard: Die dezentrale Alternative zum Zentralbankensystem* (2019) 260.

61 Saifedean Ammous *Der Bitcoin-Standard: Die dezentrale Alternative zum Zentralbankensystem* (2019) 261.

62 Bitcoin Gold is an independent fork from the original Bitcoin network.

63 Felix Holtermann *So könnten Geheimdienste den Bitcoin zerstören* (2018), available at https://bit.ly/3BrDJTP, accessed on 3 January 2024.

quantum computing[64] will not be able to make the Bitcoin network vulnerable again.

5. Summary

Cryptocurrencies are decentralised, anonymous, transparent and tamper-proof - but not independent of application and forever. Looking at the technological development, there is a great (and even existential) risk for cryptocurrency blockchains existing today, especially due to quantum computers.

64 James Butterfill *Bitcoin und das Risiko der Quantencomputer* (2021), available at https://bit.ly/41D0u1G, accessed on 3 January 2024.

III. Transaction process

To conclude the technical section, I would like to show how users transfer a cryptocurrency - using bitcoin as an example. After that, I will briefly discuss one of the biggest differences in the transfer of Bitcoin and Ether: The UXTO and the account model.

1. Example of a Bitcoin transaction

Person A wants to transfer two Bitcoins to person B. A has a software wallet, which he operates via Bitcoin Core. A's wallet (address) is assigned five Bitcoins.

A now enters B's (wallet) address and the amount of two Bitcoins as the recipient in Bitcoin Core. At the end, he signs this message/transaction with his private key, which is "E9873D79C6D87DF0FB6A5668633389F4453213303DA61F20BD67FC233BB4". A pays 0.005 bitcoin fees/fees for this transaction.

Now the following information is validated by other users (nodes) through the PoW process and stored in a new block of the blockchain: Two Bitcoins (which A previously received from C) from A's (wallet) address to B's (wallet) address. It can take approx. 10 minutes for the information to be validated and stored in the block.

B can then manage/transfer A's two bitcoins via his wallet.

2. UXTO Model for Bitcoin

Bitcoins are assigned to a wallet (address) - first person A's and then person B's, as in the example. When users call up their wallet, they see how many bitcoins are assigned to the wallet - e.g. in the example above, person A initially has five bitcoins. However, A is not assigned five Bitcoins, but two Bitcoins, one and a half Bitcoins, one Bitcoin and half a Bitcoin. The bitcoin amounts are allocated as another person transferred them to him (or originally through mining): Two Bitcoins received by A from C; one and a half Bitcoins from D; one Bitcoin from E and half a Bitcoin from F. The wallet only counts the Bitcoins together for better presentation - strictly speaking, the wallet

would have to display the unspent incoming Bitcoin amounts (unspent transaction output - UXTO) individually.[65]

Bitcoins (or the UXTO) remain in the size in which they were transferred. They are not merged. But they can be divided in new transactions up to the 8th decimal place.[66] The division is done by retransferring a part of the transferred amount. An example: A transfers two bitcoins to B. For this, an algorithm independently (and without the user being able to intervene) selects one and a half bitcoins from D and one bitcoin from E.[67] The algorithm transfers two bitcoins in total. In total, the algorithm transfers two and a half bitcoins - half a bitcoin more than instructed. This half bitcoin is transferred back to A's wallet (address) as a new input.

In contrast, the Ethereum blockchain (at least for cryptocurrencies)[68] follows a different model.

3. Account model with Ethereum

Ethereum implemented the so-called Account Model for Ether. Unlike Bitcoin's UXTO model, the account model is comparable to a bank account at first glance: Simplified, Ether merge with each other when they are assigned to a wallet (address). A coherent amount of Ether is created. When users transfer Ether from their wallet, a corresponding part of the total Ether amount splits off and is transferred to the recipient.

As with Bitcoin, however, transactions are stored individually and traceably in the Ethereum blockchain. Each Ether transaction is individualised with a so-called nonce (number only used once), which is not stored in the blocks of

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65 Arne Rettke *Bitcoin und die strafrechtliche Einziehung – Vorläufige und endgültige Vermögensabschöpfung* (2020) NZWiSt (2) 45.

66 Philipp Maume & Lena Maute, L *Rechtshandbuch Kryptowerte* (2020), ch. 1 para. 13.

67 This procedure seems artificial, since A also has a matching two Bitcoin amount. However, the Bitcoin client selects the transferring amounts in a standardised way so that as few fees as possible are incurred. The fee algorithm can also want to transfer the smallest possible amounts.

68 Ethereum uses different technologies depending on whether it is the cryptocurrency blockchain (Ether) or NFT blockchain.

the blockchain but can be traced by algorithms.[69] As with Bitcoin, Ether is about the transactions, the respective input and output from a wallet (address). With Bitcoin and Ethereum, there is an input to the user, an incoming transaction. Based on the input, the user can transfer as many Bitcoin/Ether to other users as he has received through the input. The user cannot decide for himself which cryptocurrencies the user transfers or which transaction history is (continued) - neither in the UXTO model of bitcoin nor in the account model of ether. Bitcoin's UXTO and Ethereum's account model are therefore not as different as one might think.

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[69] The nonce counts in ascending order the (successful) transactions that the sender makes. If A sends 2 Ether to B, the nonce would be 1. Then A shocks 0.5 Ether to C - this transaction gets the nonce 2 etc.

C. Justification of Property

I mentioned before that the relationship between an object and a person is as old as humanity. This relationship has even become part of our everyday language: As possessive pronouns. Possessive pronouns indicate the connection between an object and a person, e.g. it is my/your/his/her computer (but also my/your/his/her idea or bitcoin). At some point between Moses' 8th commandment and today, such relationships between objects and persons were stated in law and therefore regulated by law – e.g. as property. In the next section, I give some background about the history and system of (constitutional) property law – as well as the differences in South Africa and Germany regarding the different understandings of property. At last, I take a short digression when looking briefly on the understanding of currency (due to used term cryptocurrency). However, at first, I want to look at the (non-legal) understanding of the term property.

I. Meaning of property

Everyone knows that property is one kind of relationship between an object and a person. What property exactly means on the other side, is still unclear. Thereby it is not only a legal term but due to its use in everyday language, also a term influenced by (e.g. philosophical) theories. Thus, several philosophical approaches to the justification of property have emerged, some of which I would like to present below: The utilitarian theory (1.), the labour theory (2.), the personality theory (3.), and the legal theory (4.).

1. Utilitarian theory

The first theory of property examined is also the theory that is considered the dominant justification for the creation of private property: the utilitarian theory.[70] According to Bentham's understanding of the utilitarian theory, property should be given to someone (or something) if "the overall effect of

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[70] FW Lastowka & D Hunter *The Laws of the Virtua Worlds* (2004) California Law Review (92/1) 44.

granting it is to increase overall utility or social welfare."[71] An example for using the utilitarian theory is the recognition of intellectual property in the United States Constitution.[72] According to the Constitution, patents and copyright are protected it is intended to promote the development of science and art.[73]

Whether virtual objects such as cryptocurrencies can also be considered as property thus depends, according to the utilitarian theory, on which benefit follows from the recognition of virtual property. To identify a benefit of recognition, I need to look at the situations in which cryptocurrencies play important roles. Especially regarding the today's approach that claims in the worlds of virtual assets are (mainly) based on contractual law.[74]

The need for acknowledgement of property on virtual assets can be shown by an example: If you as a user get hacked and the hacker transfers all your cryptocurrencies to his/her own account, it seems to be a kind of virtual theft. As mentioned above, theft does usually not include stealing incorporeal objects like virtual assets.[75] Some jurisdictions like South Africa and Germany have already implemented legislation to avoid a criminal liability gap.[76] And the avoidance of criminal liability gaps, as well as the overall prosecution, is a general purpose, the pursuit of which benefits society.

In South Africa, there is no criminal liability gap because s12 Cybercrimes Act states that "the common law offence of theft must be interpreted so as not

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71 Wian Erlank *Property in Virtual Worlds* (2012) 159.

72 Article 1 § 8 cl 8.

73 FW Lastowka & D Hunter *The Laws of the Virtua Worlds* (2004) California Law Review (92/1) 44.

74 There is already the first problem as there is no contractual partner when a blockchain token/coin is created, David Fox *Cryptocurrencies in the common law of property* (2018) 3.

75 About the corporeality requirement regarding electricity theft: Jamil Ddamulira Mujuzi *Electricity theft in South Africa: Examining the need to clarify the offence and pursue private prosecution* (2022) Obiter, 41(1).

76 In South Africa s12 of the Cybercrime Act, 19 of 2020 (Cybercrime Act). In Germany for example such an action would be considered as data manipulation (Section 303a of the German Criminal Code) or computer sabotage (Section 303b of the German Criminal Code)

to exclude the theft of incorporeal property." What "incorporeal property" means is not defined or explained in the Cybercrimes Act. It is very likely (especially based on my comments below) that cryptocurrencies would fall under the term "incorporeal property" as defined in s12 of the Cybercrimes Act. However, such an extension of the offence would not be necessary if one could achieve a general equation of (certain) virtual objects such as cryptocurrencies and tangible objects - as proposed and explained in this thesis.

Another advantage would be the international acceptance and uniformity. Every country in the world has rules for (tangible) property. Virtual assets could use such rules to establish their own framework. Also, virtual assets could benefit from experiences and knowledge built by transferring tangible property between persons. This would confirm the usefulness of recognition.

Overall, then, utilitarian theory does not oppose but rather strengthens the recognition of property in cryptocurrencies.

2. Labour theory

The labour theory based on the principle that one person owns (in the sense of property) what the person creates by his/her own effort and labour: "*[*w]hatsoever [man] removes out of the state that nature hath provided and left it in, he hath mixed his labor with, and joined to it something that is his own, and thereby makes it his property."[77] The most famous representative and founder of this theory was John Locke.[78]

This approach of acquiring property through "mixing labour" has been the subject of a variety of criticisms, such as *"*... 'absurd' (Olivecrona), 'meaningless' (Mavrodes), 'unworkable' (Nozick), 'incoherent' (Waldron) and a 'joke' (Waldron)."[79] Mossoff takes sides with Locke and points to a

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77 John Locke *Second Treatise of Government* (1690) 27.

78 For further information R Graham *John Locke* (2023), available at https://www.britannica.com/biography/John-Locke, accessed on 3 January 2024

79 Adam Mossoff *Locke's Labor Lost* (2002) 9 U Chi L Sch Roundtable 158.

different linguistic interpretation of what was said. When Locke uses the term "mixing labour" this should be understood as a term of art that he uses as a metaphor for productive activities. Recognising that Locke thinks of labour as a value-creating activity that is both rational and purposeful, it becomes clear that Locke's labour argument for property is situated within the philosophical context of his natural rights philosophy and should not be considered in isolation.[80]

If Locke can be understood in this way, the acquisition of property takes place through a productive activity which is rational and purposeful. A productive activity, however, does not necessarily have to produce a physically existent object. Locke had certainly aimed at physically existent things in 1690, however, his theory can be applied to immaterial things today. Thus, Mostert has said about intellectual property: "The principle rests on the conviction that a person is entitled to the fruits of his own intellectual effort and that equity demands that he is entitled to reap where he has sown."[81]

Unlike intellectual property, however, virtual property does not necessarily require intellectual effort, but computer effort. If, however, the computer as a tool, as, for example, stabbing weapons for killing animals were in Locke's time, then the effort of the computer as human labor can also be seen in this way. Because of this broad understanding of Locke's labor theory, other scholars also see virtual property as covered by the term "property".[82] Furthermore, an English court (case *Millar v. Taylor*) ruled that "literary ownership of a published work was recognised by the common law. The justification for the recognition and protection of this literary property was

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80 Adam Mossoff *Locke's Labor Lost* (2002) 9 U Chi L Sch Roundtable 160.

81 F Mostert *The development of the natural-law principle as one of the principles underlying the recognition of intellectual property. A historical survey from Roman law to modern-day law* (1987) 104 SALJ 480.

82 TJ Westbrook *Owned: Finding a Place for Virtual World Property Rights* (2006) 3 Michigan State LR 791; FW Lastowka & D Hunter *The Laws of the Virtual Worlds* (2004) California Law Review (92/1) 47; Wian Erlank *Property in Virtual Worlds* (2012)156-157.

based on the natural law principle that a person should reap the fruits of his own ingenuity and labor."[83]

3. Personality theory

The personalised theory is based on the understanding that man needs certain things to survive, which are therefore his property.[84] According to Hegel (one of the most famous representatives of the personality theory), , however, must not be understood only in terms of food and drink; rather, property also includes the development of one's personality in the external sphere.[85] Or in other words, "property rights are related to human rights such as freedom, identity, and privacy-either as a necessary condition for them or in connection with them."[86]

If property is understood as an expression of personality, a limitation to physical objects cannot be implied. Why should a parlor game, which serves the own expression of personality, be recognised as property rather than a virtual computer game? Lastowka and Hunter go even further when saying that there is "no distinction between the accumulation of real-world chattels or land and its virtual analogs" according to the personality theory.[87]

A slightly different understanding of the personality theory was held by Radin, who in her 1993 work distinguished between two types of property connection: personal and fungible.[88] "Personal" property is property that is associated with the person and the loss of which would cause damage that exceeds the monetary value of the property (e.g. Cuddly toy from childhood

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83 *Millar v Taylor* (1976) 4 Burr 2303 98 ER 201.

84 FW Lastowka & D Hunter *The Laws of the Virtua Worlds* (2004) California Law Review (92/1) 48.

85 GWF Hegel *Hegel's Philosophy of Right* (1896) 41.

86 FW Lastowka & D Hunter *The Laws of the Virtua Worlds* (2004) California Law Review (92/1) 48.

87 FW Lastowka & D Hunter *The Laws of the Virtua Worlds* (2004) California Law Review (92/1) 48.

88 MJ Radin *Reinterpreting Property I* (1993) 32.

or souvenir photos). “Fungible” property, whereas, is exchangeable and does not have a value which exceeds the monetary value (e.g. money).[89]

But even if one takes Radin's understanding of personality theory as a basis, there is no reason not to regard virtual objects as capable of being owned. That cryptocurrencies (as de facto means of payment) are fungible seems obvious. Since Radin herself mentions money as an example of fungible property, cryptocurrencies would also have to be covered by property (because there is no difference between physical and virtual objects).

4. Legal theory

The last property theory I would like to examine is the legality theory. In contrast to the other theories, the legality theory does not see property as something that is inherent in human beings by its very nature but understands property as something that is generated and determined solely by the law.[90] One of the greatest supporters of the legality theory is Adolf Wagner.[91]

The biggest criticism of the legality theory (especially from law side) is that it is circular.[92] Property theories are supposed to help understand what property means. If the legality theory states property means what the law says, the next step is to investigate what the law says. To know what the law says, the law must be interpreted – especially what property means in particular. This brings us back to the initial question of what property means. The legality theory does not help at all to understand what property means or whether property can be extended to cryptocurrencies.

But the legality theory is right about one thing: regardless of philosophical theories of property (which at least do not oppose the recognition of virtual

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89 MM Scoot Boone *Virtual Property and Personhood* (2008) 723.

90 Friedrich Bassenge *Zur Philosophie des Eigentums* (1937) Archiv für Rechts- und Sozialphilosophie (31/3) 326.

91 Adolph Wagner *Lehrbuch der politischen Ökonomie 2/e* (1879) 120.

92 Friedrich Bassenge *Zur Philosophie des Eigentums* (1937) Archiv für Rechts- und Sozialphilosophie (31/3) 327.

property)[93], the law must also be open to the incorporation of virtual objects such as cryptocurrencies.

5. Summary

According to all the theories listed, it is possible to have ownership of objects other than physical objects. In principle, it is therefore possible to include virtual objects such as cryptocurrencies under the concept of property. That is why I consider the legal concept(s) of property below.

II. South Africa

In a legal sense, property means rights of a person over certain objects.[94] The law of property (as well as the whole law in South Africa) originates from Roman-Dutch (also known as Roman-Germanic or civil) as well as English law.[95] Compared to Anglo-American law, the meaning of property is quiet smaller which in general only covers tangible and perceptible assets except some intangible assets like stated intellectual property or creditors right.[96] In Anglo-American law, property is not seen as a law about an object but as a law about rights.[97] Other way around in Roman-Germanic law: That law is see as a law about an object, which is why property always links to an assets, mainly to a thing. What a "thing" is and which objects are covered by this term also depends from jurisdiction to jurisdiction – but mostly a kind of tangibility is required. Furthermore, within the jurisdictions, the understanding of property differs depending on the area of law in which the word is used. For example, I distinguish at least between the constitutional

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93 FW Lastowka & D Hunter *The Laws of the Virtua Worlds* (2004) California Law Review (92/1) 49.

94 P Badenhorst & WF Juanita Pienaar & H Mostert *Silberberg and Schoeman's The law of property* (2006) 9.

95 P Badenhorst & WF Juanita Pienaar & H Mostert & A Pope *The Principles of The Law of Property in South Africa 2/e* (2020) s1.4.; Erlank "Things" in Mueller et. al. *General Principles of South African Property Law* (2019) s2.1.

96 Erlank "Things" in Mueller et. al. *General Principles of South African Property Law* (2019) s2.2.2.1.

97 Erlank "Things" in Mueller et. al. *General Principles of South African Property Law* (2019) s2.2.2.1.

understanding of property (which tends to be broad due to the constitution's aim of creating the widest possible scope of protection), the private law understanding of property and the tax and currency law concept of property.

After a short introduction, I give an insight in the scope of (constitutional understanding of) property in South Africa and Germany. Please take note that both in South Africa and in Germany there is a difference between constitutional understanding of property and private law[98] understanding of property. That objects are recognised as property in the constitutional law sense is necessary for recognition in the private law sense. However, from the constitutional law recognition does not follow the private law recognition. For the private law recognition further conditions must be present as described under B.II.2.

1. Constitutional property

Nowadays, the best-known and most powerful regulation on property as well as my starting point in South Africa is stated in s25 of the Constitution of the Republic of South Africa, 1996 (hereinafter the "**Constitution**"). Although s25 of the Constitution only writes a negative right guarantee,[99] one must recognise a right of property to be able to follow the negative guarantee. However, s25 of the Constitution does not define what (the right of) property means or on which objects you can get property. Van der Walt follows this approach to not given an abstract definition:

> "[T]he meaning of section 25 has to be determined, in each specific case, within an interpretative framework that takes due cognizance of the inevitable tensions which characterize the operation of the property clause. This tension between individual rights and social

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98 Civil law understanding is also known as common law understanding in South Africa: D W Freedman "Constitutional Law: Bill of Rights – s25 in W A Joubert (founding ed) The Law of South Africa (Volume 5(4) - Second Edition) 143.

99 Negative because s25 of the Constitution does not state that property is guaranteed but that property is not restricted (unless s25 states something else), D W Freedman "Constitutional Law: Bill of Rights – s25 in W A Joubert (founding ed) The Law of South Africa (Volume 5(4) - Second Edition) 140.

responsibilities has to be the guiding principle in terms of which the section is analysed, interpreted and applied in every individual case".[100]

These case-by-case decisions are intended to balance the public interest and the rights of the individual. The disadvantage of this approach is that property has no end, but also no beginning. Therefore, I can use the above-mentioned philosophical theories of property to determine the extent of property in the sense of s25 of the Constitution – with the result that cryptocurrencies can be part of the (constitutional) term "property".

Other law acts than the constitution state and require property[101] but there is no general law act regarding property. Van der Walt states some requirements for a (hypothetically) general property law act which are mainly based on s25 of the Constitution.[102] Until now, the law of property generally consists of the Constitution, legislation as well as case law[103] and governmental agency announcements, such as the revenue services[104].

Furthermore, neither the constitution nor other law acts tell us what opportunities a property right creates to its holder. Generally, it is common sense that the most important opportunity is the absolute nature of property rights. This means that the owner of the property right can exercise it against anyone, e.g. (in principle) demand that any other person surrender objects owned by him.[105] However, this does not mean that property rights take

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100 AJ Van der Walt *Property and Constitution* (2012) 28.

101 For example s64 (1), (2) lit. a National Land Transport Act 5 of 2009: "*owner*" of a vehicle.

102 AJ Van der Walt *Property and Constitution* (2012) 27.

103 Remarkable cases are i.a. *First National Bank of SA Ltd t/a Wesbank v Commissioner, South African Revenue Service; First National Bank of SA Ltd t/a Wesbank v Minister of Finance* (2002) 4 SA 768 (CC) and *Mkontwana v Nelson Mandela Metropolitan Municipality* (2005) 1 SA 530 (CC)*; Bissett v Buffalo City Municipality* (2004) ZACC 16*; Transfer Rights Action Campaign v MEC, Local Government and Housing, Gauteng* (2005) 1 SA 530 (CC).

104 SARS *SARS's stance on the tax treatment of cryptocurrencies* (2021), available at https://www.sars.gov.za/media-release/6-april-2018-sarss-stance-on-the-tax-treatment-of-cryptocurrencies/, accessed on 3 January 2024.

105 G Wille *Wille's Principles of South African Law* 9/e (2007) 19.I.3.

precedence over all other rights - rather, they must be limited for the rights of third parties or particularly important public goals.[106] Another relevant point is that property is a totality of rights and not a bundle of rights[107] (such as copyright)[108].

One common point which everyone agrees with is that there is property on things. But which other (in particular incorporeal) objects can fall under the term property?

2. (Incorporeal) objects as property in the understanding of different areas of law

Like I mentioned before, it is common sense that there is (constitutional) property on other objects as things (except Wille who does not distinguish between the terms property and thing and uses them - more or less - as synonyms).[109] Examples could be intellectual property rights, where the name already implies that they are subject to property[110] - but also goodwill, electricity or virtual objects. At last, I take a brief look at the opinion of South African Revenue Service.

a) Intellectual Property Rights

As obviously the wording (intellectual property) seems to be there was much debate when the Constitution was drafted as to whether intellectual property rights were covered by the Constitution's property clause.[111] During the certification of the Constitution, there was an objection that intellectual

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106 Section 25 (2) Constitution of South Africa; D W Freedman "Constitutional Law: Bill of Rights – s25 in W A Joubert (founding ed) The Law of South Africa (Volume 5(4) - Second Edition) 142.

107 Erlank "Things" in Mueller et. al. *General Principles of South African Property Law* (2019) s3.1.6.4.

108 OH Dean & A Dyer *Introduction to Intellectual Property Law* (2014) 1.1.1.

109 G Wille *Wille's Principles of South African Law 9/e* (2007) ch. 19.II.1.e.

110 P Badenhorst & WF Juanita Pienaar & H Mostert & A Pope *The Principles of The Law of Property in South Africa 2/e* (2020) s2.3; Erlank "Things" in Mueller et. al. *General Principles of South African Property Law* (2019) s2.2.1.

111 *Ex parte Chairperson of the Constitutional Assembly: In re Certification of the Constitution of the Republic of South Africa*, 1996 (4) SA 744 (CC) para 75.

property rights are not covered by the Constitution. This objection was rejected because no general trend has been identified to include intellectual property rights separately in the constitution. On the other hand, this statement cannot be understood as an argument against IP as part of property as it is logical that intellectual property rights are not included separately in the constitution if they already fall under property.

In *Laugh It Off Promotions CC v South African Breweries*, the Constitutional Court argued in this direction and stated that "the protection of trade marks is of importance and that despite a measure of what it calls judicial reluctance their status is that of property albeit incorporeal."[112] However, the court made it clear that "like other property intellectual property does not enjoy special status under the Constitution."[113] In *National Credit Regulator v Opperman*, the Constitutional Court confirms its opinion "trade mark to be property, albeit incorporeal, deserving protection under section 25."[114]

b) Claim for loss of earning capacity or for loss of support

In *Law Society of South Africa v Minister for Transport* the Constitutional Court stated that "Section 25(4)(b) [of the Constitution of South Africa] makes it clear that property is not limited to land. It must follow that both corporeal and incorporeal property enjoy protection."[115] The court left the question open "whether a claim for loss of earning capacity or for loss of support constitutes 'property' but also held that the court "will assume without deciding in favour of the applicants that a claim for loss of earning capacity or of support is 'property'."[116]

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112 *Laugh It Off Promotions CC v South African Breweries International (Finance) BV t/a Sabmark International and Another* [2005] 2006 (1) SA 144 (CC) 17.

113 *Laugh It Off Promotions CC v South African Breweries International (Finance) BV t/a Sabmark International and Another* [2005] 2006 (1) SA 144 (CC) 17.

114 *National Credit Regulator v Opperman and Others* [2012] 2013 (2) BCLR 170 (CC) 61.

115 *Law Society of South Africa and Others v Minister for Transport and Another* [2010] 2011 (1) SA 400 (CC) 83.

116 *Law Society of South Africa and Others v Minister for Transport and Another* (2010) 2011 (1) SA 400 (CC) 84.

c) Goodwill

The Constitutional Court of South Africa held also that goodwill in the field of competition is a valuable asset and therefore subject to the property protection of s25 of the Constitution.[117]

d) Electricity

Mujuzi discussed electricity as part of property so that electricity theft can be judged as theft. He therefore deals with another understanding of property, the criminal understanding. At first, he mentioned *S v Mintoor* in which the court held that

> "[A]ccording to the common law, only tangible or corporeal things were capable of being stolen. Electricity is not a physical thing but a form of energy... The common law rule that only a tangible or corporeal thing was capable of being stolen had not been expanded by any South Africa [sic] court. The only expansion of this basic rule had occurred in respect of the theft of money."[118]

Thus, the court did not assume that property capable of being owned must always be corporeal, but that previously courts have seen it that way - which does not mean that it must always be seen that way. That's why a court in *S v Ndebele* extended theft to electricity. As reason, the court stated that

> "nothing physically has been taken from the battery; however, its characteristics have changed. It appears to me that modern-day society has already advanced and accepted that there can be theft of this nature … It has long been recognised that the abstract and incorporeal nature of a right, which has been taken in the context of notes and coins, is a loss."[119]

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117 *Phumelela Gaming and Leisure Limited v Gründlingh and Others* (2006) 2007 (6) SA 350 (CC) 34.
118 *S v Mintoor* (1996) 1 All SA 451 (C) 514.
119 *S v Ndebele* (2012) 3 SA 226 (GSJ) 238.

Especially the first sentence of the court's statement can be well applied to other cases: the characteristics have changed. This is also the case with cryptocurrencies when they are transferred (involuntarily or voluntarily) to other people - it changes the allocation of themselves. The court in the *S v Ndebele* cases has thus established the basis for the recognition of virtual property in cryptocurrencies.

e) Virtual objects

Regarding to other virtual objects which could fall under the term "property", Fairfield stated three requirements which has to be fulfilled: "rivalrousness, persistence, and interconnectivity."[120] According to Fairfield, every type of virtual assets (like e.g. cryptocurrencies) which fulfils these requirements can (or rather should) be treated as real-world property.[121] In this context, he does not distinguish between a constitutional and civil law understanding of property.

Rivalrousness means that the owner is able to exclude other people from using his/her objects. Fairfield named some examples for rivalrousness virtual object, e.g. domains or e-mail addresses.[122] I will discuss cryptocurrencies are rivalrousness below.[123]

Persistent in that context means lasting for a long (unspecified) time. Cryptocurrencies are persistent, in fact more persistent than every tangible thing in the world because cryptocurrencies will exist as long as the underlying blockchain is stored on at least one user computer. In Germany alone, 12% of the population are users of the Bitcoin network, which is about

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120 JAT Fairfield *Virtual Property* (2004) Boston University Law Review (85, 1047) 1053.

121 JAT Fairfield *Virtual Property* (2004) Boston University Law Review (85, 1047) 1053.

122 JAT Fairfield *Virtual Property* (2004) Boston University Law Review (85, 1047) 1054.

123 See. E.I.6.

10 million people.[124] These approx. 10 million users alone show that a complete deletion of the Bitcoin blockchain is almost impossible.

Finally, interconnection. This means that all objects influence each other. This is obvious in the real world, because already two objects cannot be at the same place at the same time. But what about cryptocurrencies? There are interconnections, too. For example when cryptocurrencies (like most) are built on a public blockchain. In this case, the transaction history until the current owner can be viewed on the network - other users can view the information from the cryptocurrency as. According to Fairfield, this type of information transfer is sufficient for the interconnection. He mentions the internet and e-mail addresses as examples, which also interact with others by passing on information.

As a result, cryptocurrencies could be considered as property by fulfilling Fairfield's requirements.

f) South African Revenue Service (SARS)

As one of the first official bodies in South Africa, the SARS has been dealing with the question of whether crypto assets can be recognised as property in terms of the Taxation Law since 2014.[125] The SARS (in line with the South African regulatory framework) uses the term crypto assets, which is defined as

> "a digital representation of value that is not issued by a central bank, but is traded, transferred and stored electronically by natural and legal persons for the purpose of payment, investment and other forms of utility, and applies cryptography techniques in the underlying technology."[126]

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124 Mathias Brand *Wie verbreitet sind Kryptowährungen?* (2023), available at https://de.statista.com/infografik/22561/anteil-der-krypto-nutzer-in-ausgewaehlten-laendern/, accessed on 3 January 2024

125 South African Revenue Service *How did we get here?* (2023), available at https://www.sars.gov.za/individuals/crypto-assets-tax/, accessed on 3 January 2024.

126 South African Revenue Service *What is it?* (2023), available at https://www.sars.gov.za/individuals/crypto-assets-tax/, accessed on 3 January 2024

The term crypto asset also covers those cryptocurrencies discussed in this paper.

From SARS point of view, crypto assets are not considered to be legal tender.[127] In a position paper on crypto assets from 2021, the SARS lists a bunch of countries and their opinion on whether crypto assets are property for tax law reasons. Inter alia tax authorities in Norway[128] and the United States of America[129] consider crypto assets as property.[130]

The SARS does not explicitly name crypto assets as eligible for property, but I agree with *Harvey* that the categorisation as an "asset" implies eligibility for property.[131] Asset is defined as

> "property of whatever nature, whether movable or immovable, corporeal or incorporeal, excluding any currency, but including any coin made mainly from gold or platinum; and (b) a right or interest of whatever nature to or in such property;. It follows that the SARS classifies crypto entities as eligible for property (i.e. as an asset)."[132]

However, the SARS deals with a concept of property under tax law that is not congruent with the private law concept of property. *Harvey* sets out the reasons why the SARS categorises crypto assets as property.[133] However, just little can be deduced from this for private law property.

III. Germany

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127 South African Revenue Service *FAQs: Crypto assets* (2020) Q1.

128 South African Revenue Service *Position paper on crypto assets – IFWG, CAR WG* (2021) 48.

129 South African Revenue Service *Position paper on crypto assets – IFWG, CAR WG* (2021) 52.

130 For a broader overview over taxation law and cryptocurrencies in other countries: Shaun Parsons *Developing a foundation for a globally coordinated approach to the taxation of crypto-asset transactions* (2022) 32-33.

131 Nicola Ann Harvey *The Legal Classification of Cryptocurrency in South African Law: An Argument for Classification as Currency* (2019) 44.

132 Section 1 Income Tax Act 58 of 1962.

133 Nicola Ann Harvey *The Legal Classification of Cryptocurrency in South African Law: An Argument for Classification as Currency* (2019) 45.

As in South Africa (and in many other countries), Germany states the right on property in its constitution as well as in civil law (German Civil Code).

1. Constitutional property

Article 14 of the German Basic Law ("GG" – Grundgesetz) includes a guarantee about property whose "content and limits" will defined by law. Just as in the South African Constitution, the concept of property in the German Constitution must therefore first be determined. The main purpose of the property guarantees in art14 GG is the defensive function in the case of measures by the state.

2. (Incorporeal) objects as property

Besides things, rights in rem and claims under private law, and intellectual property rights insofar as they have a monetary value fall under the scope of art14 GG.[134] This includes in particular:

- Copyright[135]
- Patent[136]
- Trademark[137]
- Domain[138]
- Trade secrets[139]

But there are some other objects where discussions are still ongoing whether they are protected by art14 GG, in particular data in general as well as cryptocurrencies.

a) Data

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134 Overview: V Epping & C Hillgruber *BeckOK Grundgesetz* (2023) art14 GG 48.
135 *Beschl. vom 7. 7. 1971* – BVerfG, 1 BvR 765/66, NJW 1971, 2163.
136 *Beschl. vom 15.01.1974* - BVerfG, BvL 5/706/70; BvL 9/70, GRUR 1974, 142.
137 *Beschl. vom 22.5.1979* - BVerfG, 1 BvL 9/75, N JW 1980, 383.
138 *Beschl. vom 24.11.2004* - BVerfG, 1 BvR 1306/02, NJW 2005, 589.
139 *Beschl. vom 14.3.2006* - BVerfG, 1 BvR 2087/03, NVwZ 2006, 1041.

Since personal data was recognised in German private law as a payment asset,[140] the debate has flared up anew as to whether and what kind of data is covered by the protection of property under art14 GG. So far, the German Constitutional Court has not ruled on this issue. However, data shall only be covered by the protection of property under art14 GG if a right (or at least a legal position) exists in it.[141] The question of whether there is a general right to data is dealt with below under D.III.

b) Cryptocurrencies

In the case of the Blockchain and cryptocurrencies, at first glance, the classic defensive function of the property guarantee cannot apply, since the Blockchain is in the realm of the private. However, the Federal Constitutional Court has seen the essential characteristics of constitutionally protected property in the fact that a pecuniary right is assigned to the entitled person just as exclusively as property of a thing for private use and for his or her own use and disposal.[142] This also extended the factual scope of protection of art14 GG.[143] Hillemann concludes from a comparison with claims, monetary assets and, the share securitised in stocks (which all fall under art14 GG) that cryptocurrencies also fall under the constitutional concept of property.[144]

All in all, it is common sense that cryptocurrencies are subject to property under art14 GG because the rights in the Basic Law are to be understood as wide as possible in order to generate the greatest possible protection for the rights holders.[145]

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140 Section 327 (3) German Civil Code.

141 Fabian Michl *„Datenbesitz" – ein grundrechtliches Schutzgut?* (2019) NJW (38) 2732.

142 *Beschl. vom 13.05.1986* - 1 BvR 99/85, NJW 1986, 2561.

143 Dennis Hillemann *Bitcoin und andere Kryptowährungen – Eigentum i.S.d. Art. 14 GG? Wie Kryptowährungen Grundrechtsschutz genießen* (2019) Computer und Recht 833.

144 Dennis Hillemann *Bitcoin und andere Kryptowährungen – Eigentum i.S.d. Art. 14 GG? Wie Kryptowährungen Grundrechtsschutz genießen* (2019) Computer und Recht 835.

145 V Epping & C Hillgruber *BeckOK Grundgesetz* (2023) art14 GG 64-68.

IV. Cryptocurrency as currency?

A question that arises from the very word: Are cryptocurrencies also currencies in the legal sense? Contrary to *Harvey*, I do not see the terms currency and property as alternative but also as cumulative.[146] In other words, cryptocurrencies could also be eligible for property and be a currency. but what does a classification as currency depend on?

Harvey distinguish between a legal and a economic currency concept in South Africa. Legally currency is what the law says is currency. Therefore, it is needed an official act to establish a currency in a law sense. In South Africa, the South African Reserve Bank Act 90 from 1989 as well as Currency and Banking Act 31 from 1920 clarify that coins and notes issued by the South African Reserve Bank have legal tender.[147] Cryptocurrency, on the other side, "does not have a legal tender status" according to the South African Reserve Bank.[148] Therefore, cryptocurrency does not fall under the legal currency concept.

The economic currency concept says that money is everything what does what money does.[149] So, whether cryptocurrency can be considered as currency or not depends on the characteristics that are attributed to a currency in economic terms. But even if cryptocurrency fulfils the characteristics of a currency, there is no change from a legal view. Whether there is a need to change the legal concept of currency (like *Harvey* argues),[150] is not in the scope of my work.

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146 Nicola Ann Harvey *The Legal Classification of Cryptocurrency in South African Law: An Argument for Classification as Currency* (2019) 49.

147 An overview about South African cryptocurrency legislation in: William Chandler De Kock *Regulating cryptocurrencies in South Africa* (2019) 33-34.

148 National Payment System Department of the South African Reserve Bank *Position Paper on Virtual Currencies* (2014) 2.

149 Nicola Ann Harvey *The Legal Classification of Cryptocurrency in South African Law: An Argument for Classification as Currency* (2019) 52.

150 Nicola Ann Harvey *The Legal Classification of Cryptocurrency in South African Law: An Argument for Classification as Currency* (2019) 67.

The term currency is also not uniformly defined in the German legal system. I differentiate between two concepts of currency: The private law concept and the public law concept.

The private law concept of currency based on the idea that the parties in charge (e.g. Buyer and seller in a purchase) can decide whether they classify cryptocurrency as currency which can be used to pay according to sec244 German Civil Code.

Currency in the public law sense is a legally recognised means of payment (like the legal currency concept in South Africa). It requires a legal act of recognition. In addition to Euro coins and notes (Art. 128 TFEU; Art. 10 sentence 2, Art. 11 sentence 2 Regulation [EC] 974/98; Section 14 (1) sentence 2 Federal Bank Act), electronic money (Section 1 (2) sentence 3 Payment Services Oversight Act) has also been recognised to date.

There is no physical object that embodies cryptocurrency like Bitcoin. Therefore, cryptocurrency - if at all - could only be categorised as e-money in accordance with Section 1 (2) sentence 3 Payment Services Oversight Act. It states:

> "e-money is any electronically, including magnetically, stored monetary value in the form of a claim on the issuer which is issued against payment of a sum of money in order to carry out payment transactions with it within the meaning of Section 675f (4) sentence 1 German Civil Code and which is also accepted by natural or legal persons other than the issuer."

However, there is no issuer in the case of cryptocurrency and therefore no claim within the meaning of the definition quoted above. Issuers are economic entities that issue securities or similar documents on the money or capital markets or have them issued with the help of a banking syndicate for the purpose of raising capital. The lack of an issuer is due to the decentralised nature of all cryptocurrency. It is therefore not possible to pay a sum of money to a specific entity and have cryptocurrencies created in return - because no single entity controls the crypto asset network. Crypto exchanges do make it

possible to exchange money and cryptocurrencies. However, in line with the name, values are only exchanged and no new cryptocurrencies are created.

The German legislator has also proactively spoken out against cryptocurrency as currency (in the public law sense) - namely through the creation of sec1 para.11 sentence 4 and sentence 5 German Banking Act. According to these provisions, cryptocurrencies are

> "digital representations of value that are not issued or guaranteed by any central bank or public authority and do not have the legal status of currency or money, but are accepted by natural or legal persons as a means of exchange or payment or for investment purposes on the basis of an agreement or actual practice and that can be transferred, stored and traded electronically."

According to all of the above, cryptocurrencies are not to be subsumed under the (public law or legal) concept of currency, which admittedly does not have to be permanent: The legislator (in South Africa as well as in Germany) could establish the legal status of money at any time – like El Salvador.[151] The private law or economic concept of currency depend on the will of the parties and the way the cryptocurrency is used – but do not have any influence on the question of property rights on cryptocurrencies at all.

V. Summary

There are several theories of property which are mostly based on philosophical principles. Considering the four major theories, there is not even one theory providing for limitation of ownership to physical objects. Therefore, cryptocurrencies could fall under the term property.

In South Africa and Germany, property is part of the Constitutions (s25 and art14) and the concept of property is understood in a broad way. In both

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151 Benjamin Daniel *El Salvadors Präsident zockt mit seinem Land* (2022), available at https://bit.ly/3FJei32, accessed on 3 January 2024.

jurisdictions, those concepts of property contains also other objects as things. Germany as well as South Africa have already acknowledged that there are other objects which you can have property (in the constitutional sense) on – for example (written) intellectual property rights like copyright, trade secret and so on. Following that, I will investigate whether cryptocurrencies (or coins/token of cryptocurrencies) can be considered as intellectual property in the next chapter.[152]

[152] As the right and understanding of intellectual properties is more global than almost any other field of law, I will not distinct formally between German and South African jurisdiction but will point out if there are national peculiarities.

D. Intellectual property rights on cryptocurrencies

Thinking about intellectual property rights and cryptocurrencies, there are just a few possible options: copyright, (european) database right as well as right on data and cryptocurrency right *sui generis*. Just in this order I will be figuring out the connection between each other. Where necessary, I point out similarities or differences between German and South African legislation at the appropriate places.

I. Copyright

Copyright protected can only be original works according to s2 (1) Copyright Act 98 of 1978 (referred to as "**CPA**").[153]

1. Work

a) Computer programs

The CPA lists in s2 (1) various kinds of works, like literary, artistic, or cinematograph. Among those well-known categories of work, there is one kind of work which is just implemented (as a separate category) in few states: Computer programs. Computer programs "means a set of instructions fixed or stored in any manner and which, when used directly or indirectly in a computer, directs its operation to bring about a result"[154]. The "set of instructions" means the source code of the program.

Can cryptocurrencies be considered as computer programs? At least, the program which can be used to manage and transfer cryptocurrencies is a computer program under s2 (1) (i) CPA.[155] Commands bring therefore a result

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153 The German Copyright Act contains provisions similar to the South African Copyright Act, e.g. s2 (1) no. 1 for computer programs.

154 Section 1 (1) ("computer programs") Copyright Act.

155 Eleni Tzoulia *The blockchain ecosystem in the light of intellectual property law* (2019) JIPITEC 290 para. 27.

for cryptocurrencies, for example, when receiving and transferring cryptocurrencies.[156]

But it must be distinguish between the blockchain-technology which cryptocurrencies are based on and the individual cryptocurrency coin/token. The individual cryptocurrency coins/tokens are not a computer program, but only the result of a computer program, namely the underlying blockchain technology.[157]

Therefore, cryptocurrencies cannot be considered as computer programs for copyright protection whereas the underlying blockchain technology can be considered as computer programs.

b) Literary work

Are there other possible works under which cryptocurrencies could be considered? Yes, as literary work. Besides novels, stories, textbooks etc., literary work also includes compilations and tables of data stored in a computer (or in a medium used with a computer).[158] The blockchain network which cryptocurrencies are based on is like a compilation of different information which are stored on the computers of the blockchain users.[159] For considering an object as work, there is only a low skill requirement for the content of the object. Such requirement characterises the originality.

c) Collective works and Databases

Besides the protecting of compilations and tables of data stored in a computer (or in a medium used with a computer) as literary work in South Africa,[160]

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156 Merih Erdem Kütük-Markendorf *Rechtliche Einordnung von Internetwährungen im deutschen Rechtssystem am Beispiel von Bitcoin* (2019) 107.

157 Merih Erdem Kütük-Markendorf *Rechtliche Einordnung von Internetwährungen im deutschen Rechtssystem am Beispiel von Bitcoin* (2019) 108.

158 *Biotech Laboratories (Pty) Ltd v Beecham Group Plc and Another* (2002) ZASCA 11.

159 Merih Erdem Kütük-Markendorf, ME *Rechtliche Einordnung von Internetwährungen im deutschen Rechtssystem am Beispiel von Bitcoin* (2019) 108.

160 *Biotech Laboratories (Pty) Ltd v Beecham Group Plc and Another* (2002) ZASCA 11.

the German Copyright Act protects collections of works, data or other independent elements that are a personal intellectual creation due to the selection or arrangement of the elements (so-called collective works) as an independent type of work.[161] Additionally, databases are a type of work, too. Databases mean a collection whose elements are arranged systematically or methodically and the individual elements of which are individually accessible by electronic or other means.[162] The blockchain network on which cryptocurrencies are based is like a compilation of various information stored on the computers of blockchain users and therefore, it could be a type of work under s4 German Copyright Act.

2. Originality and author

Originality (as stated in s2 CPA)[163] means that the work has been created by the author's own independent skill, labour or judgement. It is a result of the "sweat of the brow" of the author.[164] The standard on the originality requirement is not too high: For example, street directories,[165] list of football games,[166] and price lists[167] are already considered as original.

Cryptocurrencies can hardly be seen as original due to the fact that any information stored in the blockchain is generated by a computer and the user cannot influence the process. But to classify a work as original, it is necessary for the author to take action himself.[168] Therefore, the individual user of cryptocurrencies cannot be considered an author - not even in the mining process explained above (see B.I.4.), in which a new cryptocurrency coin/token is created. The blockchain technology creates a cryptocurrency

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161 Section 4 (1) German Copyright Act.
162 Section 4 (2) German Copyright Act.
163 For Germany in s2 (2) German Copyright Act.
164 OH Dean & A Dyer *Introduction to Intellectual Property Law* (2014) ch 1.3.2.
165 *Haupt v Brewers Marketing* (2006) 4 SA 458 (SCA) 47.
166 *National Soccer League T/A Premier Soccer League v Gidani (Pty) Ltd* (10/48519) (2014) ZAGPJHC 33.
167 *Payen Components South Africa Ltd. v Bovic Gaskets CC* (448/93) (1995) (4) SA 441 (AD).
168 Merih Erdem Kütük-Markendorf, ME *Rechtliche Einordnung von Internetwährungen im deutschen Rechtssystem am Beispiel von Bitcoin* (2019) 108.

coin/token automatically without any action on the part of the subsequent owner, which is why this owner cannot be considered as author.[169]

However, you could argue (like AI-generated objects) that the developer of the blockchain has created it by own independent skill, labour, and judgement. This argument is supported by s1 (1) ("author") (h) CPA: The authorship of computer-generated works. There is only a need for a regulation about the authorship of computer-generated work if computer generated work can be copyright protected; can be considered as original. The developer of the cryptocurrency-blockchain could be the author according to s1 (1) ("author") (h) CPA if he has made the arrangements necessary for the creation of the work. But which arrangements are necessary for the creation of cryptocurrencies? The developer of the blockchain network implements the rules under which cryptocurrencies can be created, stored and transferred. However, the developer cannot decide which information are stored but it depends on which users transfer how much cryptocurrency. Therefore, it is unlikely that the developer can be considered as the author and therefore the blockchain itself as work – and this is a good result given the scope of copyright.

3. Scope and transfer of copyright

What does a copyright owner[170] gets out of his/her copyright? Copyright is not one alone-standing right, but it is a bundle of rights.[171] Which rights the copyright owner gets depend on which work was created. For example, in the case of a literal work in question here, the copyright owner is entitled to the rights provided for in s6 CPA (or in ss15, 31 German Copyright Act). These rights are exploitation and use rights related to the copyrighted work.[172] However, these rights do not fit the cryptocurrency coins/tokens. All the

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169 Merih Erdem Kütük-Markendorf *Rechtliche Einordnung von Internetwährungen im deutschen Rechtssystem am Beispiel von Bitcoin* (2019) 109.

170 Who is usually the author, s21 CPA, s7 German Copyright Act.

171 OH Dean & A Dyer *Introduction to Intellectual Property Law* (2014) ch 1.1.1.

172 Merih Erdem Kütük-Markendorf *Rechtliche Einordnung von Internetwährungen im deutschen Rechtssystem am Beispiel von Bitcoin* (2019) 109.

rights mentioned in s6 CPA are not possible with coins/token. For example, coins/token cannot be reproduced, published or, performed.

Another problem would be the transfer of copyright by transferring the coins/token. Section 22 CPA provides for how the copyright can be transferred. The minimum requirement for the transfer is that an assignment is made in writing (Section 22 (3) CPA).

Another problem would be the transfer of copyright by sending the coin/token. Section 22 CPA provides for how the copyright can be transferred. The minimum requirement for the transfer is that an assignment is signed in writing. The writing requirement can be seen in conjunction with s12 Electronic Communication and Transactions Act 25 of 2002 (referred to as "**ECTA**"). Section 12 ECTA states that a writing obligation is fulfilled if the information is in form of a data message and "accessible in a manner usable for subsequent reference". Transferring coins/token can be considered as data message under s1 (1) ("data message") CPA as it is an electronic representation of information (at least) stored by electronic. However, the signature requirement is based on s13 CPA. According to s13 (1), for signature requirements that follow from the law, it is necessary that "*advanced electronic signature*" was used. According to s1 (1) ("advanced electronic signature") CPA, an advanced electronic signature "means an electronic signature which results from a process which has been accredited by the Authority as provided for in section 37." When cryptocurrency coins/tokens are transferred using software and the wallet, it is not an accredited method. As a result, the possible copyright would not pass when the respective coins/tokens are transferred.[173]

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[173] Under German law, the transfer of copyright is even less applicable to cryptocurrencies. According to s34 German Copyright Act, copyright cannot be transferred wholly, but only the rights of use. However, this does not fit with the absolute and complete transfer of cryptocurrency coins/tokens (Merih Erdem Kütük-Markendorf *Rechtliche Einordnung von Internetwährungen im deutschen Rechtssystem am Beispiel von Bitcoin* (2019) 110).

4. Summary

As shown, copyright law does not fit cryptocurrencies on several levels. Already in the case of protected works, cryptocurrency blockchains and coins/tokens could at maximum be classified as literally works. The originality requirement cannot be met by cryptocurrency coins/tokens. Finally, the scope of copyright and the transfer possibilities do not fit cryptocurrencies either.

II. Database right

In addition to (database) copyright,[174] there is also the so-called database right granted to producers of databases. This right is a *sui generis* intellectual property right which based on Directive 96/9/EG[175] for member states of the European Union. Unlike (traditional) copyright law, the database right does not protect the creative selection and arrangement of the database content, but the investment in the acquisition, collection, verification, processing, and presentation of the content itself. The object of protection is therefore the database as a totality of the content collected with substantial investment.[176] A database may also be subject to copyright and *sui generis* protection at the same time.[177] South Africa had not implemented a *sui generis* database right.[178]

In Germany, the protection of databases is regulated by s87a German Copyright Act. Database means a collection of works, data or other

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174 Many researchers consider the *sui generis* database right even as a (independent) part of copyright. This thought based on the purpose of the *sui generis* right to close a protection gap for non-copyright protected databases. Furthermore, in some jurisdictions (e.g. Germany), the *sui generis* database right is included in the Copyright Act (Section 87a-e German Copyright Act).

175 An overview about Directive 96/9/EG and blockchain: Eleni Tzoulia *The blockchain ecosystem in the light of intellectual property law* (2019) JIPITEC 290 para. 28-33.

176 T Dreier & G Schulze *Urheberrechtsgesetz 7/e* (2022), Before s87a para. 1.

177 *Football Dataco Ltd u.a. ./. Yahoo! UK Ltd u. a., Football Dataco u.a. ./. Yahoo! UK u.a.* (2012) EuGH (C-604/10) GRURInt (2013) 436.

178 NI Moleya *Evaluating the copyright protection of databases in South Africa: a comparative analysis with the European Union* (2020) IPLJ (8/1) 57.

independent elements arranged in a systematic or methodical way and individually accessible by electronic or other means and whose obtaining, verification or presentation requires a substantial qualitative or quantitative investment.[179] A cryptocurrency blockchain (but not the individual coins/tokens) is independently accessible via the internet/electronically and contain permanently recorded as well as methodically created content.[180]

To get *sui generis* protection under s87a of the German Copyright Act, the database must also require a substantial investment in terms of its nature or size.[181] The investment is to be understood broadly and does not have to be of financial nature, but can also consist of commitment of time, work and energy.[182] To achieve the purpose of the database right, (encouranging the creation a database) the requirement is low.[183] It is sufficient if, when viewed objectively, no quite insignificant expenditures that could be easily made by anyone were necessary to create the database; investments of substantial weight are not necessary.[184] The investment can be seen in any case in the amount of work that the developer of the blockchain network, which is the basis of the respective cryptocurrency, provides. However, this right is only available to the developer of the blockchain network and not to the individual user of the cryptocurrency coins/token.

But the individual user of the coins/token may be a joint owner together with the developer of the blockchain.[185] In this context, the individual user does not need to do a substantial investment because the substantial investment is

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179 Section 87a (1) German Copyright Act.

180 Merih Erdem Kütük-Markendorf *Rechtliche Einordnung von Internetwährungen im deutschen Rechtssystem am Beispiel von Bitcoin* (2019) 110; N Hohn-Hein *Securing IP rights in blockchain technology - A German law perspective* (2021), available at https://www.cliffordchance.com/insights/resources/blogs/talking-tech/en/articles/2019/07/securing-ip-rights-in-blockchain-technology-from-a-german-law.html, accessed on 3 January 2024.

181 Section 87a (2) German Copyright Act.

182 T Dreier & G Schulze *Urheberrechtsgesetz 7/e* (2022), s87a para. 12.

183 Sebastian Pech *Who owns the blockchain?* (2021) 16 J. Bus. & Tech. 72.

184 *Urt. v. 1.12.2010* ("*Zweite Zahnarztmeinung*") – BGH, I ZR 196/08, GRUR 2010, 724.

185 Sebastian Pech *Who owns the blockchain?* (2021) 16 J. Bus. & Tech. 73.

just need once that the database right arises.[186] Sadly, neither the German Copyright Act nor the underlying Directive 96/9/EG states any rules for joint ownership. Assuming that developers and users have to make all decisions together, this would not be expedient for cryptocurrencies: it would make no sense if every user had to ask the blockchain developer for permission before making a transaction. Conversely, it makes no sense if the developer of a blockchain has to approve or reject millions of requests (every day).

That's why there is no chance for the individual user to gain a database right on cryptocurrency.

III. Right on Data

Some (German) scientists also deal with the question of whether there is an independent right to data, to which cryptocurrency coins/tokens could also be subject to. Mostly, the right to data is derived from the constitutional concept of property (Article 14 GG)[187] or the constitutional concept of personality/privacy (Article 1 and art2 GG).[188] Even though comparable regulations exist in the Constitution of South Africa (Section 25 or s10 and s14 of the Constitution), there have been no discussions to date about a general right on data.

An unanswerable question that arises when one recognises a right to data: who is entitled to this right? Hoeren would like to distinguish according to the type of file creation. If the file is created by an act of the user, this user is entitled to the right. If the file is created automatically by a computer program, the right belongs to the person who owns the storage medium (usually the hard disk of the computer).[189] This is already causing problems for

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186 Sebastian Pech *Who owns the blockchain?* (2021) 16 J. Bus. & Tech. 76.

187 Overview: Michael Dorner *Big Data und Dateneigentum* (2014) Computer und Recht (9) 617; Thomas Hoeren *Dateneigentum - Versuch einer Anwendung von § 303a StGB im Zivilrecht* (2013) MMR (486) 486.

188 Michael Bartsch *Die „Vertraulichkeit und Integrität informationstechnischer Systeme" als sonstiges Recht nach § 823 Abs. 1 BGB* (2008) Computer und Recht (10) 613.

189 Thomas Hoeren *Dateneigentum - Versuch einer Anwendung von § 303a StGB im Zivilrecht* (2013) MMR (486) 488.

cryptocurrency coins/tokens: The blockchain in which the cryptocurrency coins/tokens exist has been stored independently by each user of the blockchain network. If, for example, new coins/tokens are created by mining (see section B.4. above), this is an automatic process. The owner would therefore be the person who owns the storage medium. With distributed ledger technologies such as the blockchain, all users of the respective network would then have to own the right to the newly created coin/token. An unacceptable conclusion.

Moreover, no unified idea is yet apparent as to what should follow from the right to data. Or in other words: What does the right to data actually give the owner? Recognising the right to data cannot only serve the idea of having a right to data without any positive benefit.[190] Often, scholars cite solely the simplified enforcement of law of tort for cryptocurrencies.[191]

Last but not least, it is also difficult to treat all types of data equally, as too many differences (e.g. un/centralised, temporary or permanent, un/encrypted) have emerged between data forms for this to be possible, especially due to new technologies such as the blockchain.

In sum, I do not believe that a general right on data would have solved more problems than it would have created.

IV. Cryptocurrency Right *sui generis*

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190 Merih Erdem Kütük-Markendorf *Rechtliche Einordnung von Internetwährungen im deutschen Rechtssystem am Beispiel von Bitcoin* (2019) 110.

191 Michael Bartsch *Die „Vertraulichkeit und Integrität informationstechnischer Systeme" als sonstiges Recht nach § 823 Abs. 1 BGB* (2008) Computer und Recht (10) 613; Alexander Weiss *Die Rückabwicklung einer Blockchain Transaktion* (2022) Neue Juristische Wochenzeitschrift 1366; Johannes Arndt *Bitcoin-Eigentum* (2021) 64.

Instead of a general right on data, there could be a cryptocurrency right *sui generis.*[192] Legal science must have the possibility to develop the law in order to be able to react to new technological, scientific or social developments and to remain capable of acting.[193] An independent development of the law also does not impair legal certainty, insofar as prerequisites and limits are established at the same time as the law is created.[194] Therefore, I discover in the next two sections if the requirements for creating a right *sui generis* are fulfilled and if there are other rights which could prevent the recognition of a *sui generis* right.

1. Creating right *sui generis*

In order to establish *sui generis* right, a position recognised by law is required, which in principle fits into the regulatory framework of intellectual property rights.[195]

Cryptocurrency coins/token are already recognised by law. In Germany (or rather the European Union), there are already many acts in which cryptocurrency coins/tokens are recognised.[196] In South Africa, there are also acts[197] as well as governmental announcements[198] that recognize the ownership of coins/tokens as a legally protected position.

However, it is questionable whether a right to cryptocurrencies would fit into the existing system of intellectual property rights. Intellectual property rights are defined as rights that exist in intangible, intellectual and marketable goods

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192 Jan-Peter Psczolla *Virtuelle Gegenstände als Objekte der Rechtsordnung* (2009) jur-PC (17) 6.

193 Merih Erdem Kütük-Markendorf *Rechtliche Einordnung von Internetwährungen im deutschen Rechtssystem am Beispiel von Bitcoin* (2019) 116.

194 Merih Erdem Kütük-Markendorf *Rechtliche Einordnung von Internetwährungen im deutschen Rechtssystem am Beispiel von Bitcoin* (2019) 117.

195 Jan-Peter Psczolla *Virtuelle Gegenstände als Objekte der Rechtsordnung* (2009) jur-PC (17) 7.

196 For example, Markets in Crypto Assets Regulation (MiCA) (EU) 2023/1114 and Transfer of Fund Regulation (EU) 2023/1113.

197 Overview: Z Adam *An Overview of the Regulation of Cryptocurrency in South Africa* (2021) Pretoria Student Law Review (15) 370.

198 SARS *SARS's stance on the tax treatment of cryptocurrencies* (2021), available at https://www.sars.gov.za/media-release/6-april-2018-sarss-stance-on-the-tax-treatment-of-cryptocurrencies/, accessed on 3 January 2024.

and which primarily serve to satisfy the pecuniary interests of the person to whom the right is assigned by the legal system on the basis of his or her performance worthy of protection.[199] Coins/Token of cryptocurrencies are incorporeal, marketable goods and satisfy property interests, but the performance worthy of protection is problematic. As already discussed above, cryptocurrencies are created automatically (mining - see B.I.4.). There is therefore no performance worthy of protection that can be linked to. But let's take a look at other principles of intellectual property rights.

Intellectual property rights are also absolute rights effective against everyone, which can be transferred to third parties or at least licensed. That means, as a characteristic feature of an intellectual property right is that it conveys an exclusive (absolute) legal position. Exclusive rights are first and foremost prohibitive rights on the basis of which the beneficiary can prohibit third parties from influencing the intangible property within the scope of his legal powers, but they also convey a positive right of use.[200] The assignment of coins/tokens to the holder also applies to anyone. Only the holder can manage the coins/tokens, in particular receive or transfer them.

While the (intellectual) property becomes existent through a real act, the intangible property right - detached from the different, subjective interests of persons existing in the intellectual work - develops its own independence as an object of the legal order. That would be fit for coins/token as well because coins/token shall be independent from the rightholder as person.

Thus, an essential prerequisite for the recognition of an intangible property right is that an objectification can take place, which makes it possible to assign the object to different persons. Objectification in this context does not necessarily mean that materialization must take place (which would not work for coins/tokens). Instead, it is sufficient if the object can be assigned to other persons. This is the case with cryptocurrencies through the blockchain,

199 Haimo Schack *Urheber- und Urhebervertragsrecht 10/e* (2021) para. 19.
200 Haimo Schack *Urheber- und Urhebervertragsrecht 10/e* (2021) para. 21.

because it indicates at any time to whom coins/tokens are and have ever been assigned.[201]

The content of the exclusive right is determined to a large extent by the material interests of the rightholder; in particular, the rightholder should be able to prevent the economic exploitation of the intangible property.[202] As noted above in copyright, one of the biggest problems here is when you want to combine intellectual property rights and cryptocurrencies. Intellectual property rights such as copyright, trademark or patent allow the owner to perform certain acts and give him the right to prohibit certain acts. For example, s6 CPA for literal works or s34 Trade Marks Act 194 of 1993 for trademarks. All intellectual property rights allow only specific acts. However, a right to cryptocurrencies would be about a comprehensive right of use and exclusion of the holder.[203] The owner of cryptocurrencies does not only want to be able to read them, but also to send them.

Furthermore, you must take the different approach of tangible and intellectual property into account. Like I mentioned above, property on tangible objects is as old as humanity and can be considered as human right.[204] Compared to that, intellectual property has a more economic approach as the intellectual property should be protected i.a. to save the owner the monetary profit.[205]

In this respect, cryptocurrencies do not fit into the system of intellectual property rights.[206]

2. Numerus clausus principle

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201 Jan-Peter Psczolla *Virtuelle Gegenstände als Objekte der Rechtsordnung* (2009) jur-PC (17) 9.

202 Jan-Peter Psczolla *Virtuelle Gegenstände als Objekte der Rechtsordnung* (2009) jur-PC (17) 8.

203 As tangible property: TW Merrill *Property and the Right to Exclude* (1998) Nebraska Law Review (77) 732.

204 Depending on the property theory which you prefer, see C.I.

205 AJ Van der Walt & RM Shay *Constitutional Analysis of Intellectual Property* PER / PELJ 2014 (17) 1, 066/612.

206 Johannes Arndt *Bitcoin Eigentum* (2021) 38.

Mostly, researchers argue against a *sui generis* immaterial right that it violates the numerus clausus principle. It states that only the manner of transfer and the modalities of original acquisition that fall into one of the few recognised categories are recognised by law.[207] For example you cannot give the copyright owner more rights out of his/her copyright as stated in the Copyright Act 98 of 1978. This principle applies to intellectual property rights as well as to (tangible) property rights.[208] But does the numerus clausus principle apply if you want to create immaterial right *sui generis*? No as no one extents existing rights.[209] The numerus clausus principle would apply if cryptocurrency coins/token would be protected under copyright and a new manner of transfer the copyright on the coins/token shall be created. As shown above, cryptocurrency coins/token are not covered by an intellectual property right. Therefore, the numerus clauses principle cannot apply. There are already several intellectual property rights recognised which are not embodied in an Act and started as *sui generis* rights, too.[210]

On the other hand, the German Federal Court held that there is no independent right to domains, because it is not enough if an object by its very nature allows absolute access only for one person. In the case of these, only the owner can publish content on the domain. Instead, a domain is the totality of contractual claims between the holder and the person who grants the domain.[211]

As a result, whether the numerus clausus principle stands in the way of recognizing a *sui generis* cryptocurrency right cannot be answered unequivocally.

3. Summary

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207 Hanri Mostert & Leon Verstappen *Practical approaches to the Numerus Clausus of Land Rights* (2015) Modern Studies in Property Law 1-31.

208 There are some researchers who argue against the numerus clausus principle for intellectual property rights – see an overview: Jan-Peter Psczolla *Virtuelle Gegenstände als Objekte der Rechtsordnung* (2009) jur-PC (17) 10.

209 Johannes Arndt *Bitcoin Eigentum* (2021) 64.

210 For example, Trade Secrets.

211 *Urt. v. 7.5.2005 („Domain-Pfändung")* – BGH, VII ZB 5/05, NJW 2005, 3353.

In sum, there are concerns against the adoption of a cryptocurrency right *sui generis*. On the one hand, cryptocurrencies do not fit into the system of intellectual property rights, since users of cryptocurrencies do not only want to perform individual acts, but require a comprehensive right of use and exclusion (technically already held). Secondly, the numerus clausus principle is not unproblematic because the argument alone is not sufficient that cryptocurrency holders can technically already use their coins/tokens alone and exclude others.

V. Summary

There are possible intellectual property rights for the developer of the blockchain underlying the cryptocurrency (e.g. database right). But users have no intellectual property right to coins/token. This is also correct, because the right of use and exclusion that exists for coins/token does not match intellectual property rights.

For this reason, I turn back to (tangible) property and review whether opening up (private law) property to cryptocurrencies is appropriate.

E. Extending (private law) property on cryptocurrency

I. South Africa

The usual object of property is a thing. What a thing is on the other hand, is not as clear as the common usage of the term indicates.[212] There are five characteristics which describe what objects can be covered by the term thing: external to persons/impersonal nature, appropriability, use and value, independence and, corporeality.[213]

1. External to persons/impersonal nature

External to persons/impersonal nature means that there is no way a person can be considered as part of property – persons are legal subjects and not legal objects.[214] In this regard, slavery has been prohibited in South Africa since 1834.[215] As easy as this sentence sounds as many difficulties can arise in special circumstances, in particular after the death of a person. Whether a corpse or parts of a corpse (like an organ) can be considered a thing is still being discussed.[216] Due to the natural impersonal nature of all cryptocurrencies, this requirement does not affect in our case at all.

2. Appropriable

Furthermore, a thing is appropriable if it is capable of being subjected to human control.[217] But human control does not mean that persons must control

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212 In the same way: P Badenhorst & WF Juanita Pienaar & H Mostert & A Pope *The Principles of The Law of Property in South Africa 2/e* (2020) s2.2.1.

213 In the same way: P Badenhorst & WF Juanita Pienaar & H Mostert & A Pope *The Principles of The Law of Property in South Africa 2/e* (2020) s2.2.1; Erlank "Things" in Mueller et. al. *General Principles of South African Property Law* (2019) s2.1.

214 Erlank "Things" in Mueller et. al. *General Principles of South African Property Law* (2019) s2.2.3.2; G Wille *Wille's Principles of South African Law 9/e* (2007) ch. 19.II.1.b.

215 Emancipation Order of the English Parliament of 1 December 1834.

216 The National Health Act 61 of 2003 handles with such circumstances but nevertheless the question about considering as a thing remains open; G Wille *Wille's Principles of South African Law 9/e* (2007) ch. 19.II.1.b.

217 Erlank "Things" in Mueller et. al. *General Principles of South African Property Law* (2019) s2.2.3.4.

the object just by their own strength or at every time. It is sufficient if humans can control the object in specific ways with the help of other means at any time in the past.[218] Therefore, it does not mean that there is no human control that cryptocurrencies can only be controlled by computers and the internet.

3. Value

The object must also have a monetary, sentimental, or other value for a person.[219] But that value does not have to be a positive one. Therefore, even unwanted or dangerous objects can be considered as things as their value is a negative one.[220] The same applies if the object only gets value if it is processed further (like dead leaves to compost).[221] This applies to cryptocurrencies as many people pay for those assets.

4. Independence

Independence means the object must be "a define and distinct entity that can exists separately from anything else and must have a well-defined existence in space."[222] For example water can be only considered as a thing if it is placed/stored in a container.[223] Cryptocurrencies are independent if they are unique/distinguishable, because if so, they can exit for themselves regardless any other objects.[224]

5. Corporeality

Finally the most difficult requirement, is corporeality which means that the property must be tangible. If an object is not tangible, it could therefore not

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218 P Badenhorst & WF Juanita Pienaar & H Mostert *Silberberg and Schoeman's The law of property* (2006) 29.

219 P Badenhorst & WF Juanita Pienaar & H Mostert & A Pope *The Principles of The Law of Property in South Africa 2/e* (2020) s2.2.1.5.

220 G Wille *Wille's Principles of South African Law 9/e* (2007) ch. 19.II.1.e.

221 Erlank "Things" in Mueller et. al. *General Principles of South African Property Law* (2019) s2.2.3.5.

222 Erlank "Things" in Mueller et. al. *General Principles of South African Property Law* (2019) s2.2.3.3.

223 G Wille *Wille's Principles of South African Law 9/e* (2007) ch. 19.II.1.c.

224 See above C.I.1.

be considered as a thing. This requirement is not uncontroversial as the term property has a broader use nowadays which also covers incorporeal objects like shares, or intellectual property right[225] Also the Constitutional Court believes that property includes besides tangible objects like socks or homes also intangible (or rather intellectual) objects but does not say that intangible objects should be covered as things or by other terms.[226] Willie criticises that by covering incorporeal objects by the term thing, the distinguishing between real, personal, and intellectual property rights.[227] I doubt that it is necessary to distinguish between these three groups of rights as there are no practical differences in creating or enforcing between these rights.

The constitutional law understanding does not have direct significance as there is a difference between the constitutional understanding of property under s25 of the Constitution and the understanding of (private law) property. As seen under constitutional law understanding of property, it is not excluded from the outset to consider incorporeal objects under the concept of (private law) property.

As a result, I figured out that cryptocurrencies fulfil four out of five requirements. The last non-fulfilled requirement of corporeality may be a relic from older times and no longer may have any right to exist.[228]

6. Rivalrousness instead of corporeality

a) Changing common law

Before I go on to talk about whether cryptocurrencies (or coins/tokens of cryptocurrencies) should be considered eligible for property, I would like to briefly discuss how and who can make changes in the South African legal

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225 P Badenhorst & WF Juanita Pienaar & H Mostert & A Pope *The Principles of The Law of Property in South Africa 2/e* (2020) s2.3.

226 *Phumelela Gaming and Leisure Ltd v Gründlingh and Others* (2006) (8) BCLR 883 (CC).

227 G Wille *Wille's Principles of South African Law* 9/e (2007) ch. 19.II.1.a.

228 JAT Fairfield *Virtual Property* (2004) Boston University Law Review [Vol. 85:1047] 1054.

system. South Africa follows a mix of the two best-known legal systems: civil and common law. In particular, the law of property originates from common law. Common law means that there is no comprehensive set of legal norms and statutes. Common law is based on some scattered statutes, i.e. decisions of the legislature, but it is largely based on precedents, i.e. judicial decisions that have already been made in similar cases.[229] That's why the underlying theory is called doctrine of precedent in South Africa. When a (higher or on own level but larger)[230] court ruled on a particular case, its decision was not only binding for the parties concerned, but had to be followed in future cases of the same kind by lower courts, thus becoming part of general or common law.[231] If a new situation resembled a previous case but was not exactly the same, then the judge had three options: He could follow the old way, he could call the old way wrong or he could distinguish the earlier decision and keep its application limited to the specific facts it governed.[232]

In our case, it would be most likely to distinguish between the old property of tangible objects and new virtual property of rivalrousness (virtual) objects as a new situation. And thus to further develop proprietorship.

b) Rivalrousness

That property is always connected to tangible/corporeal objects based on the past as there were just physical objects to own. The most named reason why property cannot be extended to intangible objects nowadays is that (private law) property is rivalrousness. Rivalrousness means that the owner can exclude other people from using his/her objects. For a long time, this principle

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229 L Mayali *The common law and civil law traditions* (2017), available at https://www.law.berkeley.edu/wp-content/uploads/2017/11/CommonLawCivilLawTraditions.pdf, accessed on 3 January 2024.

230 G Devenish *The Doctrine of Precedent in South Africa* (2022) Obiter (28 [1]) 3.

231 J Dainow *The Civil Law and the Common Law: Some Points of Comparison* (1966) The American Journal of Comparative Law (15/3) 424.

232 J Dainow *The Civil Law and the Common Law: Some Points of Comparison* (1966) The American Journal of Comparative Law (15/3) 425.

only applied to physical/tangible objects (i.e. things).[233] But today, there are virtual things which use is rivalrousness, too – for example cryptocurrencies. Users manage (i.e. receive and transfer) cryptocurrencies via software and their wallet, i.e. the public and private key. Without the owner-wallet to which the cryptocurrencies are assigned, no one can do anything with the cryptocurrencies. Therefore, it is the same situation as with physical objects, which without an action of the holder (cryptocurrencies: Passing on the wallet; physical object: gaining access) cannot be used by any person. Another example which Fairfield uses are internet addresses because no one except the owner can post content to that address or e-mail addresses where no one except the owner can send or receive e-mail on that address.[234]

Such a coins/token are also not copyable or manipulable in any way. Due to the transaction histories contained in the coins/tokens (as well as the nonce for blockchains using account models), each coin/token is unique.[235] In addition, the users of the respective blockchain networks monitor the correctness of all coins/tokens, which means that it is not possible for a coin/token to exist several times.[236]

The fact that coins/tokens cannot be sent individually (in most cases) is not an objection to rivalrousness. As explained above,[237] it is not possible to transfer specific coins/tokens individually on blockchains using the UXTO model or the account model. However, this does not make any difference to the right to the coins/tokens, since coins/tokens that can be transferred are also owned by the user and it makes no difference to the user which coins/tokens are transferred. This is because the coins/tokens are all fungible.

7. Summary

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233 TW Merrill *Property and the Right to Exclude* (1998) Nebraska Law Review (77) 732.

234 JAT Fairfield *Virtual Property* (2004) Boston University Law Review [Vol. 85:1047] 1054.

235 For further information see B.III.

236 See B.I.3.

237 See B.III.

In South Africa, it may generally be possible to classify virtual objects as property. For this, the corporeality requirement would have to be replaced. I suggest rivalrousness as requirement instead. This requirement (already proposed by Fairfield)[238] aims at the same goal as corporeality: Only objects which can only be used by one person at a time should be included. This used to apply only to physical objects, but now also to some virtual objects - such as coins/tokens of cryptocurrencies.

II. Germany

The law which defines content and limits is mainly the German Civil Code (Bürgerliches Gesetzbuch) which was taken into force on 1st January 1900. Starting point for (civil law) property in the German Civil Code is s903. Section 903 German Civil Code is about the owner [the person who has property] of a thing. So, the term property is linked to the term thing by law whereas in South Africa, the connection between the terms is not as clear.

1. Thing according to Sec. 90 German Civil Code

What a thing is defines s90 German Civil Code. According to that, "*only corporeal objects are things as defined by law*." As a further idea, researchers discussed de lege ferenda whether a s90b German Civil Code comparable to s90a German Civil Code should be introduced for cryptocurrencies, which would declare the property law provisions applicable.[239] This is nothing new: Expanding the concept of property in the course of technical progress was already suggested by Bydlinski in 1998, long before Satoshi Nakamoto published the blockchain technology.[240] So far, no such law has been enacted.

Besides corporeality, there are more requirements which are not stated: The object must be discernible, definable, and controllable for humans and must

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238 JAT Fairfield *Virtual Property* (2004) Boston University Law Review [Vol. 85:1047] 1054.

239 Alexander Weiss *Die Rückabwicklung einer Blockchain Transaktion* (2022) Neue Juristische Wochenzeitschrift 1366.

240 Peter Bydlinski *Der Sachbegriff im elektronischen Zeitalter: zeitlos oder ergänzungsbedürftig?* (1998) Archiv für die civilistische Praxis (16) 304.

have an impersonal nature.[241] In sum, the requirements are quite similar to those in South Africa except the use and value question which was explicit rejected by German lawmaker (German Bundestag).[242]

2. Extending civil law property to cryptocurrencies

Even as in South Africa, there are discussions in Germany about the corporeal requirement.[243] Just as a short background information: Germany has a civil law system implemented. That means the German legal system have comprehensive, constantly updated acts which cover all matters that can be brought before a court, the applicable procedure, and the appropriate punishment for each offence.[244] The task of a judge is not to develop the law, but to investigate the facts of the case and to apply the provisions of the of the law. However, a judge also has the possibility to develop the written law (albeit within narrow limits) – they can apply a specific section to facts which does not fit to the section (so-called *Analogie* or *analoge Anwendung*) – for example applying s90 German Civil Code about things to incorporeal objects like cryptocurrencies. The requirements for such an extended applying: A gap in law, unplannedness of this gap and comparability of interests.[245]

a) Law gap

A law gap means that this case is not covered by any regulation. Like shown above, there is no regulation which applies to cryptocurrency regarding granting a right. Therefore, it is a gap in law.

b) Unplanned gap

241 W Hau & R Poseck *BeckOK BGB* (2023) Section 90 para. 5.
242 W Hau & R Poseck *BeckOK BGB* (2023) Section 90 para. 9.
243 W Hau & R Poseck *BeckOK BGB* (2023) Section 90 para. 36.
244 L Mayali *The common law and civil law traditions* (2017), available at https://www.law.berkeley.edu/wp-content/uploads/2017/11/CommonLawCivilLawTraditions.pdf, accessed on 3 January 2024.
245 Christoph Luther *Die juristische Analogie* (2013) JURA (5) 449.

Such gap is unplanned if the lawmaker[246] would have applied the section to the new (misfits) facts (so to cryptocurrencies) when the lawmaker would have been aware of the facts as it created the section first.[247] Section 903 German Civil Code is one of the oldest provisions in the Civil Code. It was already contained in the German Civil Code when it came into force on January 01, 1900. At that time, a technology like blockchain was not imaginable. However, more recently, the lawmaker has implemented several acts related to cryptocurrencies. In doing so, the property law provisions have not been extended to cryptocurrencies (or rather, the lawmaker has not enacted new property regulations. The lawmaker even denied (private law) property on cryptocurrencies because they are not things.[248] It did not deal with the question of whether s903 German Civil Code can be applied by analogy - but it did deal with the question of whether rights to cryptocurrencies are necessary – and denied it. Accordingly, the Bundestag rejected the analogy by not dealing with it. Thus, it is at least unclear whether the lawmaker at that time would have considered cryptocurrencies to be capable of property, in contrast to today's legislator.

c) Comparable interests

The last part of the requirement is the most difficult (because of the normativity): The interests between the section and its facts and the new (misfit) facts is comparable if both facts are similar in all fundamental characteristics, but do not coincide exactly.[249] So for my thesis, I would have had to compare the fundamental characteristics of things and cryptocurrencies to proof the comparable interests.[250] There are good arguments for a

246 In Germany, the Bundestag can be considered as lawmaker whereby it depends on the specific law which shall be implemented which bodies need to be involved in the legislative process, Art. 77 GG.

247 *Urt. v. 03.04.1990* – BVerfG, 1 BvR 1186/89, BVerfGE 82, 6 (12).

248 BT-Drs.: 19/21157, S. 2.

249 Christoph Luther *Die juristische Analogie* (2013) JURA (5) 451.

250 What I will do in chapter E.

comparable interest between (tangible) property and cryptocurrencies. Looking at coins/token of cryptocurrencies and property, there are overlaps:

First, there are cases where a normative position (such as a property right) is appropriate to manage unacceptable circumstances in the actual situation. An example is a criminal offence like extortion: The perpetrator may threaten the victim with violence to make him hand over things. However, these things do not become the property of the perpetrator (Section 134 German Civil Code in conjunction with s253 German Criminal Code). The perpetrator has the thing in his/her hands, however. So, the property right stays with the victim whereas the perpetrator has the thing in his/her hands actually – and this situation can be fixed easier with a property right than without. By claiming the right, the victim/owner of property can become the thing in his/her hands again.

A comparable situation would be if coins/token were sent to the perpetrator due to, for example, a threat. Or if coins/token are transferred in violation of law (e.g. as wages in the case of illegal work, s134 German Civil Code i.V.m. SchwarzArbG). Without a right as a normative corrective, it is quite difficult to claim possession. A normative corrective is therefore helpful, because it would go beyond the scope here to examine whether the other possible claim in those situations (Section 812 German Civil Code) can sufficiently fix such situations.

Second, coins/token and property are much closer than coins/token and intangible/intellectual property rights.[251] Copyright, as an example of an intangible property right, assigns the right to a good to one person. This good can be used by any other person despite this - the right holder can only legally (but not actually) exclude (let) other persons. Lets take a deeper look: The composer of a song holds the copyright to the lyrics. Despite this, any other person can listen to the song, copy it, etc., because the song can be reproduced infinitely. This is a constant property with intangible assets - they are reproducible. This is not possible with coins/token. Due to the respective

[251] Please see above D.IV.1.

consensus mechanisms, each cryptocurrency can exist only once (no double spending)[252] and only the person to whom the coins/token are assigned can use it. In the same way, a thing can also exist only once and only the person who has it in his/her hands can use it. In contrast to intangible assets, this is not just a legal defense function, but in fact other people cannot use the coins/token (or the object).
But there is a circumstance that cannot be ignored (and due to which no (private law) property in coins/tokens of cryptocurrencies can be assumed at present): You cannot apply s90 German Civil Code via an *analoge Anwendung* for digital objects like cryptocurrencies, because as mentioned above the German lawmaker decided against open the term things to digital objects by introducing s90b German Civil Code for handling digital objects as things.[253]

3. Extending de lege ferenda

As extending the (private law) understanding of property to cryptocurrencies by *Analogie*/*analge Anwendung* is currently not possible, I want to look to opportunities *de lege ferenda* (in the future law). There are still discussions about extending the (private law) term property to more objects as things by implementing new law.[254] You need to keep the difference between extending the term thing, on which you can have property or extending the term property to more objects than things. In the first extension, you would have said that cryptocurrencies are things and in the second extension that cryptocurrencies are not things but you can still have property on it. This is supported by the fact that art14 GG (the property guarantee) subjects more objects to property than the regulations in the German Civil Code.

New law would have to be implemented by the (German) lawmaker. Since Germany is a member of the European Union, the European Union could also

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252 Please see above B.III.2./3.
253 Alexander Weiss *Die Rückabwicklung einer Blockchain Transaktion* (2022) Neue Juristische Wochenzeitschrift 1366.
254 Johannes Arndt *Bitcoin-Eigentum* (2021) 64.

enact such laws within the scope of its competences.[255] However, both variants are unlikely at this point in time.[256]

Should a new law be introduced and (private law) property be opened for virtual objects, I recommend (similar to South Africa) to focus on rivalrousness objects. The remarks I made there apply here accordingly.

4. Summary

According to the current state of the law, it is not possible to treat coins/tokens of cryptocurrencies as (private law) property in Germany. This is contrary to the wording of ss903, 90 German Civil Code and the intention of the legislator. The only possibility would be the creation of a new law, in which I recommend the inclusion of rivalrousness objects as in South Africa.

III. Rest of the world

1. United States of America

In the United States, there are various (state) opinions as to whether and what rights exist in cryptocurrencies.[257] The Internal Revenue Service (IRS), the federal tax authority of the USA, dealt in a 2014 Guideline with how existing general tax principles apply to transactions using virtual currency.[258] While there was still debate at the time as to whether cryptocurrencies should be currencies or property, the IRS decided to treat cryptocurrencies as property.[259]

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255 So-called Principle of conferral of powers, Art. 4 Treaty on the Functioning of the European Union.

256 Please see above E.II. 2.2.

257 Overview: Carol R Goforth *U.S. Law: Crypto is Money, Property, a Commodity, and a Security, all at the Same Time* (2018) Journal of Financial Transformation, Forthcoming.

258 Internal Revenue *Bulletin* (2014), available at https://www.irs.gov/pub/irs-irbs/irb14-16.pdf, accessed on 3 January 2024.

259 Carol R Goforth *U.S. Law: Crypto is Money, Property, a Commodity, and a Security, all at the Same Time* (2018) Journal of Financial Transformation, Forthcoming 4.

2. Australia

In Australia, cryptocurrencies could be considered as personal property under the Personal Property Securities Act 2009 (referred to as "**PPSA**"). Personal property is mainly defined as a relationship between movable objects which do not constitute land and a human[260] but according to s10 PPSA, personal property includes all property other than interests in real property. If one compare both definitions, the PPSA definition is much broader and in particular does not contain a limitation to "movable" objects. Therefore, it is possible that coins/tokens of cryptocurrencies are also considered property, even if there are not considered as movable.

To ensure protection under the PPSA, a three-step test must be completed: Attachment (enforceability against the grantor); Enforceability against third parties; and Perfection.[261]

Attachment is the point at which a security interest in personal property arises. Under attachment, a security interest in collateral is created when the grantor has rights in the collateral and the creditor has given value for the security interest. If cryptocurrency can be considered as intangible property, the grantor has rights in the collateral, according to s19 (2) PPSA. In Australia (like in South Africa and Germany), cryptocurrencies can be considered as intangible property according to s10 PPSA[262] and therefore, cryptocurrencies are enforceable against the grantor.

The enforceability of the right against third parties also follows from the classification as intangible property.

Finally, the condition of perfection must be fulfilled. There are different ways to obtain perfection (e.g. by registration). In the case of cryptocurrencies, only

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260 W He *Is cryptocurrency personal property under Australian law? It depends* (2023) Common Law Review (52, 1) 29.

261 W He *Is cryptocurrency personal property under Australian law? It depends* (2023) Common Law Review (52, 1) 30.

262 W He *Is cryptocurrency personal property under Australian law? It depends* (2023) Common Law Review (52, 1) 31.

perfection by control comes into consideration.[263] Due to the decentralisation of cryptocurrencies (i.e. the lack of a central authority), the usual categories of perfection by control do not fit cryptocurrencies. According to *He*, only an analogy to ADI accounts would be possible.[264] ADI accounts are any account with an authorised deposit-taking institution such as a bank – so you need a central (deposit-taking) institution which cryptocurrencies usually do not have. *He* argues that's why for a new category in perfection by control (and therefore for cryptocurrencies as property) as the decentralized approach of cryptocurrencies will be the technology of the future.[265]

3. Indonesia

According to Art. 499 of the Indonesian Civil Code, property can be owned, objects can be tangible and intangible, can be transferred, and have economic value. Cryptocurrencies can be considered as object and therefore as property because they are a collection of electronic data that has economic value and can be owned by someone. Cryptocurrencies have a economic value and can be owned as they are also considered as commodity in Indonesia. BAPPEBTI Regulation Number 5 of 2019, article 1 number 7 states that "cryptocurrency as an intangible commodity in the form of digital assets using cryptographic techniques, peer-to-peer networks, and distributed ledger technology to regulate the creation of new units, verify transactions, and secure transactions without third-party interference." Commodity is a relatively easily tradable, transferable and exchangeable for other products of the same type.[266]And an object can only be tradable if it has economic value and can be owned. Otherwise, no one would have an interest to trade such objects. Besides that,

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263 W He *Is cryptocurrency personal property under Australian law? It depends* (2023) Common Law Review (52, 1) 32.

264 W He *Is cryptocurrency personal property under Australian law? It depends* (2023) Common Law Review (52, 1) 34.

265 W He *Is cryptocurrency personal property under Australian law? It depends* (2023) Common Law Review (52, 1) 37.

266 MAI Bintarto *Cryptocurrency as a Digital Property in Indonesian Law Perspective* (2022) Jurnal Penegakan Hukum dan Keadilan (3/2) 108.

the economic value based on the circumstances that you can buy and sell coins/token of cryptocurrencies for Rupia as well.[267]

4. United Kingdom

In December 2019, the English High Court in *AA v Persons Unknown* accepted that cryptocurrencies are property that can be subject to an injunction as cryptocurrencies "might not be a thing in action on a narrow definition of that term, but that does not mean that it cannot be treated as property".[268] The court used following understanding of property from *National Provincial Bank Ltd v Ainsworth*:

> "Before a right or an interest can be admitted into the category of property, or of a right affecting property, it must be definable, identifiable by third parties, capable in its nature of assumption by third parties, and have some degree of permanence of stability."[269]

The English High Court is right in stating requirements here. And cryptocurrencies meet all these requirements. At first, coins/token of cryptocurrencies (or rather rights on them) are definable as well as identifiable by third parties because every coin/token is defined by its own unique transaction history, which is evident from the blockchain.[270] Furthermore, coins/token are also capable of assumption by third parties as the main purpose of coins/tokens is to be received and sent. At last, cryptocurrencies "have some degree of permanence of stability"[271] because the respective cryptocurrency will continue to exist until there are no more users of the blockchain network.[272] For example, there are approx. 10 million

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267 MAI Bintarto *Cryptocurrency as a Digital Property in Indonesian Law Perspective* (2022) Jurnal Penegakan Hukum dan Keadilan (3/2) 109.

268 *AA v Persons Unknown* (2019) EWHC 3556 58.

269 *National Provincial Bank Ltd v Ainsworth National Provincial Bank Ltd v Ainsworth* (1965) AC 1175 (1247) 8.

270 David Fox *Cryptocurrencies in the Common Law of Property* (2018) 17.

271 *National Provincial Bank Ltd v Ainsworth* (1965) AC 1175 (1247) 8.

272 For further information see C.II.2.e.

user 12% of the population are users of the Bitcoin network, which is about 10 million people.[273]

As a result, many legal scholars in the UK argue that cryptocurrencies represent a separate (*sui generis*) third category of property.[274]

5. Singapore

In 2023, the Singapore High Court hold that it should be "legally possible to hold [crypto assets] on trust".[275] To hold an asset on trust, it is required that "general recognition has been given to cryptocurrency as property in the Rules of Court."[276] In order to approve this general recognition, the High Court refers, among other things, to the above-mentioned judgement *National Provincial Bank Ltd v Ainsworth*, especially the stated requirements -[277] and confirmed that USDT [as cryptocurrency] "was definable, identifiable by third parties, capable of assumption by third parties, and had some degree of permanence or stability."[278]

However, in contrast to many UK scholars, the High Court classified cryptocurrency as "as 'choses' or 'things' in action."[279] That means that the High Court does not establish *sui generis* third category of property for cryptocurrencies but tries to implement them in the existing property system.[280]

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273 Mathias Brand *Wie verbreitet sind Kryptowährungen?* (2023), available at https://de.statista.com/infografik/22561/anteil-der-krypto-nutzer-in-ausgewaehlten-laendern/, accessed on 3 January 2024.

274 UK Law Commission *Digital assets: Final report* (2023) 4.73.

275 *ByBit Fintech Limited v Ho Kai Xin* (2023) SGHC 199 29.

276 *ByBit Fintech Limited v Ho Kai Xin* (2023) SGHC 199 30.

277 *National Provincial Bank Ltd v Ainsworth National Provincial Bank Ltd v Ainsworth* (1965) AC 1175 (1247) 8.

278 *ByBit Fintech Limited v Ho Kai Xin* (2023) SGHC 199 33.

279 *ByBit Fintech Limited v Ho Kai Xin* (2023) SGHC 199 31.

280 P Loy *Singapore Continues To Develop Protections For Crypto Assets Holders* (2023), available at https://www.ifcreview.com/articles/2023/august/singapore-continues-to-develop-protections-for-crypto-assets-holders/#_edn5, accessed on 3 January 2024.

F. Conclusion

"*I am super optimistic about the metaverse because I know how the human mind works and I am telling you this now with confidence that after 5 to 7 years most of the population of this world will live in the metaverse world.*"[281]

Even though I personally don't agree with the prediction, it sums up the development: virtual worlds will gradually become as important (if not more important at some point) as our physical world. Lawyers should therefore start thinking today about how to prepare for this development. And the easiest way to deal with new circumstances is to draw on existing systems and experience – as with tangible property and cryptocurrencies.

From the technical side, I have shown that coins/tokens of cryptocurrencies are unique and distinguishable, like otherwise only known from physical objects. Because all information in coins/tokens is encrypted and attached to each (new) transaction, it is also quite difficult to manipulate - as is the case with physical objects.

Our understanding of property also does not prohibit cryptocurrencies being treated as such. As I have shown with the philosophical theories, no limitation to physical/tangible objects can be inferred - rather, it cannot be inferred from the theories at all whether they favour tangible objects. Looking at the constitutions of South Africa and Germany, it can be said that both allow the widest possible scope of application of property - which can be filled with the philosophical approaches, for example. Moreover, it is already recognised in both jurisdictions that non-tangible objects (such as intellectual property rights) fall under the concept of property.

It is also not excluded to derive a (property) right in coins/tokens from the system of intellectual property rights. Although the existing intellectual property rights in South Africa and Germany do not fit the individual

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[281] A Jasani *Virtual World Quotes* (2023), available at https://www.goodreads.com/quotes/tag/virtual-world, accessed on 3 January 2024.

coins/tokens (but at most the blockchain network behind them), discussions about data rights or *sui generis* right to cryptocurrencies have been going on for some time. The numerus clausus principle does not prevent the creation of a new right. But in contrast to property rights in tangible objects, intellectual property rights only allow certain actions and are (rather) tailored to commercialisation and not to free use. This does not fit with a right to coins/tokens of cryptocurrencies.

But can (private law) property, which only exists in tangible objects, simply extend to coins/tokens in cryptocurrencies? Yes and no. In South Africa, as in Germany, there is only one requirement which could prohibit the recognition of coins/tokens as (private law) property – corporeality. And the requirement of corporeality could be replaced by another requirement that serves the purpose more: rivalrousness. As indicated in the technical part, humanity has long assumed that only physical objects are unique and distinguishable - that is, they can only be used exclusively by one person at a time. Nowadays, however, this is also possible in virtual space thanks to the blockchain technology. Therefore, it is possible to extend the scope of (private law) property to coins/tokens of cryptocurrencies.

However, the law systems in Germany and South Africa are different: In South Africa a mixed common and civil law system and in Germany the civil law system. Therefore, the possibilities to change/develop the law are also different. In Germany, law can be applied to situations other than those written in the law if the requirements of *analoge Anwendung* are met. These requirements include an unplanned legal gap - which does not exist because the legislator has actively chosen not to recognise property in coins/tokens. As a result, in Germany the lawmaker (European or national) must act (in the sense of creating a new law) so that (civil law) property in coins/tokens can exist. Whereas, in South Africa, courts can act more independently, especially in deviating from (common) law. There have already been some courts that have accepted the extension of ownership in individual situations, so it would not be a great novelty if a court were to adopt the requirement of property.

All in all, an expansion of (civil law) property is appropriate and can be implemented in South Africa as well as in Germany, although in Germany the lawmaker would still have to become active.

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