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"Discourses on Blockchain in the Greek Media An STS approach"

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Introduction

Blockchain technology appeared sometime in 2009 and constituted what might be called a Quantum Leap according to the writings of philosopher, critic and political theorist Fredric Jameson (1999) – i.e., a moment in time in which the previous and the subsequent conditions are vastly different. In what was proposed in a white paper bearing the signature of Satoshi Nakamoto – an alias used by an as of yet unidentified individual or a collection of individuals – a system for electronic money, which was completely peer-to-peer having transcended the need for a trusted third party to safeguard against the problem of double spending (Nakamoto 2009), was made possible. However, the technologies which enabled this innovation were, by themselves, long known in the disciplines of computer science and cryptography. Proof of Work systems were first used in the early spam filters for emails and hash functions were well known, studied and documented with various uses by cryptography specialists. What constituted the radical change that was bitcoin was the innovative combination of the parts into what the White Paper describes as the Blockchain.

Briefly on the issue of double spending, the problem can be described as analogous to having a digital photograph in one's computer. The photograph can be copied and sent to various receivers while the owner still possesses the original and can replicate it indefinitely. This scenario can be considered to be analogous to supermarket coupons being counterfeited. In the case of digital money, the fraudulent party could send copies of transactions or erase transactions altogether. Bitcoin managed to overcome this challenge by having the digital currency – Bitcoin – exist not as a file or other digital entity uniquely indexed in some filesystem or storage, but as a collection of distinct inscriptions (Nakamoto 2009). Bitcoins essentially exist as statements in the form of "X gave Y a number of Z bitcoin" where X and Y are users of the network and Z is the amount of currency exchanged, and these statements can easily be traced chronologically to calculate the total amount of currency currently possessed by any user.

Nevertheless, these inscriptions/transactions must be stored in some form of archive, and in an analogy to its non-digital counterpart in accounting, we call this collection a ledger. Bitcoin's ledger differs from an accountant's book in some obvious and some non-obvious ways. For one, it is completely digital; and, to achieve protection from the possibility of an individual or collection of individuals assuming the role of a substitute of a central authority by gaining control of a singular-ledger, the ledger itself is distributed among all the participants of a bitcoin network, each having an exact copy of the ledger and continuously updated with the most recent transactions.

The next issue would be about how to safeguard against one of these ledgers being tempered with, on purpose and systematically. This issue falls under a category of problems reduced to what is called the Byzantine Fault Tolerance. That is, ensuring that the network can be trusted to determine what is the true history of events, even if some nodes fail or maliciously present their own alternate history. Blockchain answers the consensus problem via cryptography and a Proof of Work consensus algorithm. To explain we must return to the ledger.

Like a traditional book, which has pages numbered in sequence, bitcoin also has an analogous concept: blocks. Both contain transactions, yet, unlike the aforementioned physical object, blocks are not sequentially numbered. Instead they are represented by their Hash fingerprint, which is the result of applying a Hash Algorithm with input constituting of the complete content of the Block. Hash Algorithms ensure two features. First, that the result,

called Hash, is unique for each input, and that the same input will always result in the same output. Second, that the output cannot be predicted given a known input unless the effort to apply the algorithm is made again. Good (secure) Hash Algorithms use functions which are strictly one way to facilitate this. Furthermore, one cannot discern the input from any given known output. Lastly, a good Hash Algorithm makes it is trivial to verify, given both the input and output, that they do form a pair of input and resulting hash output.

Each block further contains a timestamp and the Hash of the previous block. In this sense, they form a "Chain" of Blocks in chronological order, linked by the various fingerprints of the previous entry. For this reason, this peculiar type of "Ledger" was named the Blockchain. Discussing another one of the remaining contents of a block becomes important later, when we shall briefly consider the significance of the Proof of Work algorithm for the network. Before that, however, we must address the issue of where this digital money comes from.

Bitcoin has incentivised the process of using computational power (and shouldering a cost in expended electricity) to maintain the aforementioned ledger, constantly updated by rewarding the addition of each new block to the chain. Bitcoin is created from a function called Coinbase, which generates the bitcoins that are then added to the circulation of the network and are put in the possession of the owner of the node that added the block. The importance of this incentive becomes apparent when we discuss how new blocks are created. Adding a block to the chain, the node, after finalising the content of new transactions from among the broadcasted events in the network, must satisfy another condition of the network. That is, to find a number – chosen at random initialy– that when added to the contents of the block and further on the block gets hashed via the Hashing algorithm, the resulting fingerprint starts with a previously agreed-upon number of zero bits. If the inititial number does not satisfy this condition it is then incrementaly increased. Due to the nature of good Hashing algorithms – such as SHA-256 – proposed by the Bitcoin white paper, the result cannot be predicted; thus, the effort must be made to find a number (called the nonce) that satisfies the condition. To check the validity of a given nonce is trivial through using the algorithm. If a node finds a suitable nonce, it broadcasts the new block to the network and, then, the other nodes confirm its validity and add it to their own version of the ledger, maintaining the consensus of the chain. The longest chain is considered to be valid.

This process ensures that, in order to make a change to a past transaction, a fraudulent party must rewrite the chain from the block where the alteration takes place up to a number of blocks exceeding the current count of blocks in the blockchain. This is important because it reduces the problems of trust in a decentralised peer-to-peer network to the problem of accumulating an ever increasing, with the passage of time, aggregation of computational resources and energy. The immutability principle that makes the blockchain trustworthy is based on this concept, along with the issue of transparency that is inextricably linked with the structure of the blockchain in which all transactions and internal workings of the system are publicly available to all to scrutinise, can, to an extent, justify why this technology is indeed innovative.

Can these qualities, however, account for the foundation of the economic and social phenomenon of cryptocurrencies, whose market cap exceeds $800,187,212,334 (at the time of writing this sentence) only by taking into account the largest (Bitcoin) and second largest cryptocurrency communities (Ethereum)? By itself, no. After this brief introduction to what the blockchain is (by means of which I believe that a reader who is new to these concepts has no trouble following), I aim, with the help of the Reijers and Coeckelbergh (2016) paper titled "The Blockchain as a Narrative Technology: Investigating the Social Ontology and Normative Configurations of Cryptocurrencies", to reflect on some of the possible social reasons around

the tech-utopianist narratives of the cryptocurrency growth, as well as point out the various obfuscations of its more problematics aspects. Furthermore, we shall examine some of these issues as they appear in the related bibliography and attempt to benefit from what we find in application over a selection of articles from the Greek Media.

Blockchain in the Greek Media; Method and Questions

The extended mention of Bitcoin's blockchain was necessary for two reasons. The first being that it is historically the first blockchain implementation and the second being that it remains the most well-known paradigm of application of this technology. Blockchain as a technology has been tied to the narrative of the enabler of transformations in culture, governance and the ways people associate and organise (Tapscott and Tapscott 2016). Also, according to the vision of Chaum (1985) as expressed in Digicash – a previous attempt at decentralised internet money – what Blockchain might enable is the legitimacy of public participation over the internet, safeguard against the authoritative practices of surveillance and disciplining, and a further democratisation of the public sphere.

Contrary to this narrative, Dupont (2014) considers Blockchain an addition to the arsenal of a society of control, while Schrepel (2019) perceives an unequal relationship between basic rights in a blockchain system. Some rights are made absolute by the technology such as the right of ownership, while others, such as the right to oblivion or the right of privacy are set in a state of precariousness, where the Rule of Law is unable to mediate disputes. Similarly, the ecological footprint of a blockchain network can scale to dangerous amounts. According to the Cambridge Bitcoin Electricity Consumption Index (CBECI) – at the time of writing this sentence – Bitcoin's network consumes electricity at an estimated (average) rate of 7.17 Gigawatts, resulting in a yearly estimation (average) of 65.22 Terawatt Hour. For comparison, the average household consumes 11 thousand kWh in a year (U.S Energy Information Administration n.d.), making bitcoin the equivalent of about 5,929,091 (almost six millions) average households in energy needs.

From the above, further issues for review ensue. Blockchain creates an intermediation for ecology and the environment beyond its ecological footprint. Blockchain creates new ontologies for the natural world and the forms of social organisation around it - from governance to activism, up to its reproduction (Gabrys 2020). The narratives of technological determinism and solutionism are very dominant in this area, coming second only to articulated imaginaries concerning governance (Danaher et al, 2017; Ertz and Arsenault, 2019; Poppe 2016), imaginaries in workforce management and academia (Fachrunnisa and Hussain 2020), or imaginaries in politics, property, production (O'Dwyer 2015, 2016) and development (Jutel 2021). Colonialism seems to be another issue to be taken into account, as the vast amounts of infrastructure – the materiality of a blockchain network – appear to be accumulated in countries with a favorable legal and economic environment for this kind of investment. Also, the examples in which resources are spent for the development of blockchain networks and not in the service of endemic needs is indicative of these issues. (Jutel 2021).

Among all these authors, the issues that are indicated, stem from an estrangement towards this technology and, also, from the advantage computer scientists possess due to their technical insight and their different interpretation of the inner workings of this technology and of the material and social relationships it enforces. This privilege creates a class of

professionals equivalent to a bureaucratic elite, which is expected to enforce, through code production, the socio-technical imaginaries (Jassanoff 2015) which are promoted as the desirable future (Reijers and Coeckelbergh 2016; Ertz and Arsenault 2019) in the blockchain technology related techno-utopianist narrative. And, in return for working in enforcing those narratives, they become empowered by their work as they are better equipped to traverse the uncertainties of what is expected to be the next Industrial Revolution (Reijers and Coeckelbergh 2016; Danaher et al 2017).

In this thesis I aim to scrutinize about the interpretation of materialities and relationships of blockchain technology as constructed by the narratives in which the general public – having no interest in academic discourse or even popular science publications – is exposed through press articles. These articles are collected from some of the most widely circulated news websites in Greece, most of which are associated with print press groups, with their websites supporting search functionality. These news websites are: *Avgi (Dawn, "Αυγή"), To Vima (The Podium, 'Το Βήμα'), Efimerida ton Syntakton – Efsyn (Editors' Newspaper ,"Εφημερίδα των Συντακτών – Εφ.Συν"), Kathimerini (Daily, "Καθημερινή"), Kontra News (Contra News, "Κόντρα News"), Naftemporiki (Marine Commercial, 'Ναυτεμπορική')* and *Rizospastis (Radical, "Ριζοσπάστης").* These sites represent a variety of audiences and orientations in politics, interests and, possibly, nuances regarding social class. I have chosen to exclude possible iterations of articles about blockchain in tabloids such as *Espresso* (https://www.espressonews.gr/), *Proto Thema* (https://www.protothema.gr/) or *Makelio* (https://www.makeleio.gr/) (although they meet the criterion of being visited by audiences that have marginal interests in academic publications) due to them being of disputable journalistic quality, inflammatory and/or publishers of fake news. I have also excluded news sites that have actively participated in the growth of the Greek far-right political party and, now, condemned criminal organisation "Golden Dawn" ("Χρυσή Αυγή", "Chrisi Avgi").

Of the chosen websites, I have collected a number of articles that appeared by searching for the key word "blockchain", using similar spellings in various iterations ('blockchain', 'block-chain', 'block chain' etc.). An effort was made to minimise content focusing specifically on bitcoin, while at the same time trying to exclude bitcoin from searches as much as possible and still being able to aggregate content from articles. During the editing process of this paper, *Efsyn* published a four-page editorial on its weekend edition of 26-27 June 2021, which I decided to include in the research. The final collection is as follows:

News Website	Number of Articles	Time span
Avgi	15	2016–2019
To Vima	9	2017–2020
Efsyn	28+1 printed editorial	2016–2021
Kathimerini	6	2017–2021
Kontra News	14	2016–2021
Naftemporiki	23	2018–2021
Rizospastis	4	2018–2019
	for a total of **100 articles**	spanning the years 2016 to 2021

This collection will be categorised according to the primary narratives it creates, possible misrepresentations of the technology, possible tech-utopianism and technological determinism, and, also, the obfuscation of issues concerning the technology as mentioned above and all these will be elaborated upon.

Issues from the secondary literature

Narratives play an important role in how we understand and interact with technology. Akin to Jasanoff's Sociotechnical Imaginaries – i.e., ways in which configurations about science and technology are propagated and replicated in society and, in return, construct order about the way social relations are formulated around science and technology (Jasanoff 2007, 2015 in Reijers & Coeckelbergh 2016) – and Winner's or Hecht's understanding of the internalised political and ideological weight in material embodiments (Wiener 1980, Hecht 1994), Reijers and Coeckelbergh (2016) propose a different framework. Using Ricœur, they describe a schema of people interpreting language, which, in turn, interprets the world around them, ending in refiguring the people. In this sense, the 'prefigured' becomes 'configured' and, in turn, 're-figured'. They call this process "emplotment" in the sense that actors assume "roles" in "plots" shaped by their understanding of science and technology, the way they have envisioned it must be used, and their relationship with it. This process defines narrative structure and is profoundly normative. They further imply, in a way, that in this framework, which is "more hermeneutical than analytical" (Reijers and Coeckelbergh (2016), Jasanoff's Imaginaries become dialectical (Reijers and Coeckelbergh (2016).

Blockchain is veiled with an amalgamation of cyber- or 'cypher-punk' activism (Nakamoto 2009) and neoliberal phantasy of a minimal state (Karlstrom 2014 in Reijers and Coeckelbergh 2016). Cyberpunk, being a genre of 70s and 80s science fiction (Encyclopedia Britannica Editorial Team) that imagines a future of digitised societies run by corporation

conglomerates, and features characters that express disdain and rebellious attitudes towards the status quo, as per its second namesake of Punk-Rock music. Cyberpunk has been assumed as an identity from various hacktivists and related movements. Cypherpunk is a successor movement(s) of hacktivists albeit focusing more on cryptography (Hughes 1993). Nakamoto (2009) displays the benefits of a transparent, publicly available, fraud-proof system of electronic transactions with provisions made to ensure the user's privacy. A few years later, a bitcoin contributor by the name of Vitalik Buterin (2013) proposed a system of added features originally rejected by the bitcoin community. These features constructed a network of nodes that share computational resources to run code, called smart contracts, in a distributed fashion. In this blockchain network, named Ethereum, interested parties could author code to perform financial transactions when and if certain criteria were met, and by 'signing them' they gave them authority over their financial assets. The Ethereum community proposed many applications for these smart contracts, ranging from peer-to-peer insurance, to copyright claims, to reputation systems and – maybe more importantly for the scope of this paper – DAOs, Decentralised Autonomous Organisations (Ethereum 2013).

A DAO is an entity of Ethereum that recognises a number of members, who, with a certain level of agreement – proposedly a majority of 67% (Ethereum 2013) – can modify the code of the DAO and use the aggregate resources of its members to invest. DAOs have been associated with experiments in democracy, with ensuring financial sovereignty, freedom of speech, non-interference of externalities, lack of censorship or discrimination of any kind and a specific set of values, going as far as for example – in the case of the Ethereum Classic community – to equate code with law (Ethereum Classic 2016). Such entities of code are indeed prone to human errors and failings, and one such example resulted in the split of the Ethereum community in 2016.

In May 2016, a DAO was proposed by some members of the community (later dubbed "the DAO") and managed to amass around 150 milion dollars in cryptocurrency in a very short time (Falkon 2018; Siegel 2020). Due to a human logical error, while the platform allowed bailing out of the initiative, it was also possible to withdraw funds from the DAO in excess to one's own by recursively calling a function. A hacker managed to secure a considerable amount of funds from the DAO by exploiting the bug, at around 3.6 million Ether (the currency of Ethereum). At the time, this accounted for about 15% of the total circulation of the currency (Siegel 2020). Due to the economic importance of the event, a fork of the blockchain was proposed, negating the fraudulent transactions. A part of the Ethereum community considered the proposition a betrayal of the original ideas of the Ethereum network and, a few days after the event, on July 20th 2016, published the "Ethereum classic declaration of Independence". In it, these community members proclaim their opposition to the fork, stating that they shall continue using the old chain, as any change that does not aim to improve or enhance the features of Ethereum violates the agreed upon ethics of the endeavour: The "sanctity of the ledger" as they proclaim (Ethereum Classic 2016), in which the transactions cannot be reversed or modified, because "code is law" (Ethereum Classic 2016). In their decision to remain with the fraudulent party in the same blockchain, they further assert their opposition to the "tyranny of majority" (Ethereum Classic 2016) and issue a call to like-minded individuals to join their community and be part of their ledger. Simultaneously, the individuals who consented to the external intervention of the fork, reverting the fraudulent transactions, now use the namesake of "Ethereum" and a market capitalization of $233,484,410,005 (CoinMarketCap) as well as a crypto token value of around $2.000 per ETH coin. By contrast, the Ethereum Classic has a $5,371,345,861 total capitalization and a value per coin at about $46. Contrary to the belief that constituted the formulation of the Ethereum Classic

Community, other cryptocurrency enthusiasts consider the decision to fork the chain as a proof of the reliability of human ingenuity and a smart move that resulted in a reinvigoration of the Ether, what it stands for and the interests of its community (Parker 2016).

As a historical note, the 2016 DAO's fraudulent individual or collective cannot perform any transactions with the (now Classic) Ether they have amassed because doing so would trigger investigations (Siegel 2020). In a sense, they sit upon a goldmine (3.6mil Ether Classic or ETC at $46 each equals $165,600,000) that they cannot profit from.

This example captures one of many contradictions in the subject of Blockchain implementations and their technological and human networks that we are going to examine as part of this literature review, and it serves as a very good basis from which we can expand on our scrutiny over the narratives framing blockchain technology as they are found in the media articles.

Diverse Narratives of the Blockchain

Other examples of narratives that result in the emplotment of the technology and its users – as previously shown – such as those of the empowered individual that can make financial decisions in trustless environments and with having eliminated the economic parasitism of third parties that thrived by offering trust in being the middleman between others (Nakamoto 2009), include but are not limited to: blockchains empowering a society with less governance, more privacy, less centralisation and concentration of power, actively challenging authority and discrimination (Nakamoto 2009; Reijers and Coeckelbergh 2016; O' Dwyer 2015), benefitting the "little guy", incentivising peer-production (O' Dwyer 2015), act as an alternative legal ecosystem for those interested (Schrepel 2019), or even serve as a tool for the generation of consensus or economic negotiation in areas where active round-table deliberations are impossible, costly, or – are projected as – obsolete (Fachrunnisa and Hussain 2020; Dong et al. 2020). All these representations portray blockchain technology in a manner that appeals to particular imaginaries about its use and involved actors while simultaneously obfuscating externalities, arising issues and exclusions of societal groups deemed non-relevant. Furthermore these representations attempt to normalise these social configurations through this form of emplotment (Reijers and Coeckelbergh 2016). We shall attempt to reverse this obfuscation and gather a number of issues that serve as a counterpoint by which we shall categorise the news articles as being either in alignment with these narratives or contrary to them.

Blockchain in Governance

Here we face the narrative of individual empowerment, "less governance", efficiency of process and removal of barriers (Reijers and Coeckelbergh 2016; O'Dwyer 2015; Ertz and Arsenault 2019) along with possible imaginaries like the advent of a "one-world government with a one-world currency" (Ertz and Arsenault 2019), substituting the functions of the state (Reijers and Coeckelbergh 2016; Dovey 2018) or creating a parallel ecosystem to them (Schrepel 2019) and others less remote, and shared with the more general imaginaries (Danaher et al. 2017) of applying algorithms to governance (Reijers and Coeckelbergh 2016; O'Dwyer 2015). All these narratives share a particularity in that they have normative implications (Reijers and Coeckelbergh 2016) akin to what Jasanoff (2007) has perceived in between science-in-the-making and law, which are also co-produced along with the particular

roles, institutions and orders that the technologies get accompanied by and reproduced with (Jasanoff 2015). However, the normative aspect is not found in the code but in the ability to configure these roles with moralities and values, that is, the narrative that is embedded in the code (Ricœur 1983 in Reijers and Coeckelbergh 2016). Albeit that, smart contracts are contractual, binding and have enforcive qualities not unlike legal documents with which linguistic similarities exist (Searle 2010 in Reijers and Coeckelbergh 2016). This is why the process that creates this narrative configuration – emplotment – is important in attempting a hermeneutical approach to blockchain technology, especially in governance.

A stateless institution (much like Bitcoin's network or the DAO) is predominantly pre-configured with a libertarian understanding of personal freedom and individual empowerment (Reijers and Coeckelbergh 2016). That individual freedom is expected to add to the collective freedom of the individuals and safeguard them from large accumulations of authority that can endanger their freedom. Yet, evidence that can link this individual empowerment to the empowerment of the collective is scarce (Reijers and Coeckelbergh 2016; O'Dwyer 2015); on the contrary, it can lead to disempowerment. Blockchain serves as a mediation that can substitute trust in the absence of traditional institutions or processes which foster trust, such as the government, institutions, bureaucratic processes or various types of associations. From a political perspective, it betrays an ideological stand, according to which lengthy debate, compromise, community building, personal relationships and communal belonging become obsolete (O'Dwyer 2015), much like money itself has mediated interpersonal proximity and made financial transactions impersonal (Poppe 2016). This narrative exchanges social confidence for algorithmic regulation; it reduces social or political organisation to specifications in technological architecture and projections about user behaviour. In turn, this emerges as the result of a technocratic worldview in which the desired kind of society is the product of an appropriately designed technical system (O'Dwyer 2015). In this sense, the involvement of blockchain in any social interaction drains its dynamism, disempowering the possibility of truly free and responsible interactions (Reijers and Coeckelbergh 2016).

This also serves as the foundation of another point: using blockchain in the place of state governance creates another mode of governance (Reijers and Coeckelbergh 2016) – specifically, one that follows the historical paradigm of industry: governments become more machine-like and automated, tasks get subdivided and roles get more specialised (Danaher et al. 2017). The "Algorithmic State", much like its smart-contract empowered substitute, tends to embody a "perpetually running application" (Dovey 2018), in which the "organisation of future events" (as configured by the smart contracts) cannot, under any circumstances, be stopped or prevented (Schrepel 2019).

Along with these imaginaries of blockchain-enabled governments come the imaginaries of decentralisation (Reijers and Coeckelbergh 2016; O'Dwyer 2015) in opposition to the accumulation of authoritative power belonging to a centralised entity. Much like individual empowerment to collective empowerment, a definitive link from decentralisation to equity and egalitarian practices is hard to come by (O'Dwyer 2015). Yet, evidence exists that blockchain networks, although decentralised in architecture, are susceptible to asymmetrical power dynamics (Ertz and Arsenault 2019) and the possibility of domination from an actor or collection of actors (Reijers and Coeckelbergh 2016; O'Dwyer 2015). Interpretive distance from the technology (Poppe 2016; Reijers and Coeckelbergh 2016) by itself creates a bureaucratic class of programmers who arise as a micro-hierarchy among state officials and clerks (Ertz and Arsenault 2019). This emerging class has access to the narratives configured by the technology as opposed to narratives about the technology (Reijers and Coeckelbergh 2016). Although, according to the consensus of the participating scholars, as formed in

workgroups about algorithmic governance (Danaher et al. 2017), programmers are considered unqualified to meddle with issues and biases of governance, their privileged position is still an important topic when considering the emplotment of blockchain technology in governance. A topic that extends beyond the micro-hierarchies that enable the emplotment through the action of producing code.

Even so, another issue of obfuscation arises: the marriage of governance to blockchain tehcnology benefits parties which are already strong (Reijers and Coeckelbergh 2016). As said by O'Dwyer (2015): should some technology prove to be too disruptive, "old regime players can potentially buy a lion's share and seek rent over the new technology". This can also be true for infrastructure. Although the Internet is (mostly) free and blockchains are (mostly) open-source and transparent, infrastructure is proprietary and opaque (Reijers and Coeckelbergh 2016; O'Dwyer 2015; Danaher et al. 2017). Examples of the dangers posed by non-governmental accumulation of power through technology are apparent in the Big Five of the tech industry (Google, Amazon, Apple, Microsoft and Facebook). These dangers are especially overt on Facebook and other social media, as is an evident inability to regulate them effectively (Deibert 2019). This can be a way to approach the Enterprise Ethereum Alliance (EEA entethalliance 2021b) that boasts partnerships with, among others, Accenture, AMD, Ernst & Young, FedEx, JPMorgan Chase, and Microsoft, and whose goal is to analyse market needs for blockchain enabled applications and to set the global standards for the implementations (EEA entethalliance 2021a). Similar to proprietary infrastructures, standards can enforce along with the inclusion, also, the exclusion of others.

Poppe (2016) observes that money, a social phenomenon, creates both bridges and distancing – especially moral distancing. Blockchain, serving as an intermediation of trust, functions in a similar way. It facilitates the transpiration of contractual engagements across, beyond and in parallel to the previous regulatory barriers and, maybe, especially the limits of what was considered technological plausibility. Like accounting and management, it enforces social and economic agreements, but it also creates a different imaginary of the self (Poppe 2016).

Various issues that trouble scholars of algorithmic governance (Danaher et al. 2017) can be extended to include blockchain governance, such as the extent to which algorithms are used to control human behaviour through provocation, bias, manipulation or by placing restrictions, or even to the issues over the ubiquity of surveillance (Danaher et al. 2017; Deibert 2019) and the fact that blockchains are addressed for their permanence and immutability. Yet unlike big data and social media algorithms, blockchains are by design transparent in their architecture. However, through emplotment, they become inherently associated with their own biases and politics. This creates social, ethical and legal problems that shall be addressed below.

Legal Issues on Blockchains

In their attempt to provide functions that were traditionally monopolised by the state, blockchains create the paradox of more governance with less state. Blockchain technology pushes the limits of global legal systems, from blockchain signed marriages, which capture the belief in the contractual permanence of smart contracts, to Bitnation's (bitnation.co) attempt to extend crypto-sovereignty to include citizenship rights to a "decentralised borderless voluntary nation" with attempts at enforcing jurisdiction and providing legal services

(Dovey 2018), and even to other experiments with democracy and decision making (O'Dwyer 2015).

Briefly disambiguating, the issue extends far beyond the possible enabling of illegal activities on the internet through the use of cryptocurrencies and blockchain privacy protocols. Said anonymity – or, more correctly, pseudonymity – becomes irrelevant if, for example, the object of the transaction over the network is not purely digital, as material objects (among others) can be tracked or controlled in the physical world. Furthermore, because of the immutable nature of the ledgers, if part of the actors somehow become identified, then the chain serves as a public and permanent proof of the activities. On an additional note, the infrastructure that enables the Blockchain implementations is material and, thus, can also be regulated (Schrepel 2019; Reijers and Coeckelbergh 2016). That is not to say, however, that cryptos have not played their part in various criminal activities.

The issue concerns the ineffectiveness of the rule of law on the Internet in general and epitomised by blockchain technology (Schrepel 2019). The example of social media can be useful. The narrative of the previous decade was that social media and the internet could bring about a greater access to information and improve pluralism and democracy. That narrative fell short over more contemporary vistas of social media being the theater of psychological operations and manipulation by "state and nonstate actors alike" (Deibert 2019). Through the Brexit Referendum, US presidential elections and the subsequent outrage over the Cambridge Analytica scandal (Deibert 2019) that managed to be represented mainstream media (Cadwalladr 2020; Wong 2019) and the Netflix-distributed Documentary "the Great Hack" (Amer and Noujaim 2019), this narrative was largely replaced by those that signalled the need for added protection against surveillance and authoritarianism as enabled by the penetration of social media into every aspect of the daily lives of billions of people. Now, after legal actions taken to address – to an extent – the unlawful manipulation of users and the collection and processing of user data that enabled it (General Data Protection Regulation GDPR 2019), scholars scrutinizing over the facts agree that social media by design make profit from surveillance; an aspect which is voluntarily accepted – though mostly unknowingly – by the users, exchanged for the services provided free of charge from the platforms. These traits make those platforms rank among the most "successful enablers of authoritarianism" and spreaders of misinformation (Deibert 2019). It also highlights the difficulty of effectively regulating Big Tech companies, beyond the scope of limiting extensive networks of multinational companies, the architectural design of their business model, which is the enabler of these issues, requires, by itself, change. The difference of power between Big Tech and the various independent authorities that aim to control them weighs extensively in favour of Big Tech (Deibert 2019).

Blockchain is still at the point of ambivalence between the more historical Cyberpunk narratives that arise as providing solutions to government censorship or social media power dynamics and the movement working towards integration, the extension of state governance and the regulation of Blockchain enabled services (Reijers and Coeckelbergh 2016). The reasons behind the call of Blockchain regulation can be understood as follows: the state reserves for itself the monopoly of legal violence and the obligation to safeguard the rights of its citizens (Schrepel 2019). In the example of a Blockchain power application, the state retains these monopolies only to the extent that they can be enforced on the physical world. For example, if a citizen's right of privacy and intimacy is violated, the state's judicial functions are activated to restore legality and to deal punishment and compensation. In a blockchain environment, this is impossible to accomplish. If intimate pictures of an individual are published on a blockchain in a sharable form, or other attempts at humiliation and bullying are made in

a way that is facilitated by the permanence of the chain, the blockchain poses significant difficulties for legal enforcement (Schrepel 2019).

Blockchains seem to operate at their own internal legal framework, which Schreperl (2019) refers to as *Lex Cryptographia*. This legal system, which exists in parallel to the rule of law of the state, sometimes against and sometimes in accordance with it, holds some fundamental citizen rights to their absolute form while setting others, as discussed above, in the imperilment of possibility. Property rights are made absolute in a blockchain, to the extent that, at least, it does not extend to material goods that can be withheld by law enforcement officials. Money held in bitcoin wallets cannot be involuntarily transferred and collections of records cannot be modified; smart contract fulfillment cannot be stopped. This makes the ecosystem of *Lex Cryptographia* appealing to those who seem to challenge the state monopoly of violence and justice, as through technological means, its extent of enforcement has changed (Schrepel 2019). Technology enforces its own social contracts (Poppe 2016). Schrepel concludes that law must conform to the realities of the blockchain in the hope of safeguarding fundamental citizen rights to the extent of what is possible. That is not to say that the state is not challenging by itself the actualisation of rights that it is obliged to protect, such as the freedom of press or opinion – rights that might benefit from blockchain infrastructures, albeit with the issues that result from centralisation and opaqueness, as discussed earlier.

Citizens will be asked to choose if they are willing to abandon more rights to benefit from services (Schrepel 2019) – as with social media (Deibert 2019) – or reinforce the consent and importance of Rousseau's Social Contract – or, even, balance the pros and cons of existing in both systems simultaneously (Schrepel 2019). To this extent, the defence of the "right to say No" is fundamental (Schrepel 2019). The examination of education and practices of legal professionals, regulators and coders is also of major importance for the future (Danaher et al. 2017), as expecting the individual actors to be responsible is – time and time again proven to be – naive (Poppe 2016). The interpretive distance between the technology and the general public falls close behind, as the experimental and ethical uncertainties of blockchain decentralised app innovations is still large (Reijers and Coeckelbergh 2016) and related emplotment reconfigures narratives about the technology, until, at least, a major disaster brings the narratives existence in public scrutiny again (Reijers and Coeckelbergh 2016).

Blockchain issues on environment and health

Apart from the extensive demands in electricity that blockchain infrastructure such as bitcoin adds to the energy network, blockchain – along with initiatives like Treecycle (treecycle.ch) or Rainforest Foundation US (rainforestfoundation.org), among others – at least aimed to once (Wafula 2019, Cant 2019) or still do use blockchain technology to aid in environmental issues and combat deforestation. Treecycle allows investment in TREE coins that represent an actual, unique and specific eucalyptus tree, while Rainforest Foundation US aimed to reward cryptocurrencies from satellite validated reforestation efforts (treecycle 2021; Wafula 2019; Cant 2019).

This digitalisation of the environment – actual trees in the case of Treecycle – or digitally enabled environmental activism or the emergence of performances of digitalized consumption have been known since before the birth of bitcoin and have not been emergent trouble-free. The general narrative assumes ethical and ecological concerns from the individual actor, as well as self-discipline, self-denial and a willingness to change practices or, even, getting out of the comfort of one's daily routine to actively aid with issues such as participating in reforestation by planting saplings by hand in empty terrascapes (Garbys 2020). However, the industrialisation of other aspects of society extended to these practices as well, now including drones planting trees in an intensified, automated and controlled way. This shift might "compensate for industrialised deforestation" (Garbys 2020) as projected by that narrative, but is also responsible for a shift in how environments are managed in general.

With "technology installed on trunks and embedded in the soil" (Garbys 2020), forests become delimited within clear borders. They are observed, albeit from a distance; automated, implying absence of humans; optimised, implying being standardised and planned; datafied, as part of their demarcation. Furthermore, the interaction between humans, nonhumans and the environment is mediated by technology. These digitised practices facilitate the engagement of expert actors, while simultaneously creating inequalities, especially concerning local communities. With the narrative that technology is "necessary" and "unproblematic" to meet global ecological and sustainability goals, the focus on forests becomes global and much of what is found in the local is obfuscated (Garbys 2020). For example, for metrics that emphasize the reduction of carbon emissions, biodiversity is obfuscated along with the impact to local communities, locations and wildlife (Garbys 2020). Similarly, with automated sensors to monitor wildlife and alert for arson, forest ecosystems become securitised. Due to the ubiquitous intrusion of technology, given its need for energy and maintenance, their natural attributes are transformed into something new. Finally, it is data that becomes the object of governance and not the forests. The locations and the communities that interact and partake with them are being ignored as irrelevant (Garbys 2020).

Similarly, initiatives like EncrypGen (encrypgen.com) or Nebula Genomics (nebula.org) use blockchain to control the access and monetisation of user genetic data, while scholars propose ways to benefit from blockchain infrastructure to improve medical data sharing between medical service providers, leaving behind the paradigm of patients transferring their sensitive data from one place to another using optical disks (Patel 2018).

In these cases, the narrative concerns are focused on safeguarding against internal threats, hacking, limiting control and authority of previously key infrastructure players and, in general, giving control over to the individual with respect to privacy.

The delimitation of biological entities (such as tissues) as autonomous from the organisms they come from – and, also, from the biological systems of co-dependent growth

and reproduction that they inhabit – is highly compatible with the general trend of mass industrialisation. If the biological entity can be alienated from the organism, then it can become an object upon which property rights can be asserted and transferred – thus, enabling the transactions of biological entities and their ascribed qualities (Calvert 2008), even if not immediately apparent on the delimited biological material. Obfuscations and biases are also found in this technological domain as different legalities and moralities are emerging with their associated practices across the globe (Whittaker 2015). Issues of reducing identity and ethnicity to biologically standardised qualities are neither new nor innovative, though, through technology, they do reflect the biases of societies that co-construct their technopolitical landscapes (Whittaker 2015; Stephens et al 2018) – from associating specific ethnic groups with criminality, erasing differences of class, social, or economical status to a universalist paradigm of technology and morality, up to standardising populations through biobank sample categorisation. Clinical and reproductive labour is also obfuscated, especially in issues concerning IVF and reproductive technologies (Waldby 2008; Waldby and Cooper 2008), as individuals are alienated from their bodies through the objectification of the delimited biological material.

Stephens et al (2018) further ask us to inquire how the boundaries of identification, standardisation and classification of the biological material, as it is transformed into a bio-object, are negotiated and by whom. Blockchain in this accord has a major role to play as a legitimising compromise to the ongoing industrialisation of clinical research and biology. Blockchains in health are narrated with the imaginary of informed consent, self-sovereignty and self-determination. Blockchain applications in health present the decentralised network as a means for the individual to assert control over how, when and at which (predetermined) terms their biological data are used, even if the materiality and labour behind their data has already been objectified and is forever alienated through the interconnected web of legislation, infrastructure and biomedical practice. Blockchain, as such, shifts the focus of the discourse over biological practices from regulatory bodies, the state, the patients as a collective, and the companies that store or handle biological materials, to the individual – apparently, as an extension of rational consumptive behaviour or the exchange of some assets of private nature over access to services or specific benefits.

Added notes on Platform Imperialism, Infrastructure and Rapid Digitalisation of Governance in Developing Countries

From the time of the telegraph, the expansion of the reach of technology, communication and the imaginaries of technological universalism has intertwined technological changes with the narratives of freedom, democracy and empowerment (Jutel 2021). Through the specific configurations of the technological infrastructure, by which the above mentioned can be achieved (especially in the developing world), an agenda that is closely related to new forms of imperialism is made apparent, as imperialist power itself, gets re-configured in the contemporary forms of computational capitalism. Where control over indigenous populations was once enacted by demonstrations of power from the locus of the imperialist force, now, a simple restriction of access to the technological services that epitomizes the aspirations for local development will suffice. Where once an extensive network of political coalitions and propaganda was expected to align the local population with the visions of an imperialist power, we now find regulatory boards, hackathons, NGOs and grants to aid R&D of civil society applications (Jutel 2021).

Blockchains have become increasingly essential to this emplotment, as they substitute social values, forms of organisation and subjectivities for the transparent, efficient and immutable mediations of a universal single "truth" (Jutel 2021; O'Dwyer 2015; Reijers and Coeckelbergh 2016). With the aforementioned critique on legal issues of having *Lex Cryptographia* as a legal system (Schrepel 2019), the emerging issues become accentuated when this critique is used to contrast narratives of government corruption in developing countries, where blockchains are further attributed by the narratives the qualities of a trustworthy alternative to inefficient democratic and legal processes (Jutel 2021; O'Dwyer 2015).

Jutel (2021) gives further examples of the above in various cases from the region of the Pacific, where the visualisation of the locus as "empty" and the indigenous people as "noble savages" was easier for the lay audiences, in addition to parallels being drawn between Bitcoin and the Micronesian Rai Stone money system (Gente 2021; Morse 2018). In Papua New Guinea, the government created a Special Economic Zone in its territory with the private firm Ledger Atlas, owned by billionaire and "cryptocurrency evangelist" Tim Draper, granting the firm the ability to supplant the state: perform legislative functions, issue passports and control movement to and from. The project is presented under the narrative of experimentation with alternative governance systems, in alignment with traditional indigenous values.

Vanuatu is another example where, due to laws granting citizenship in exchange for investments (Jutel 2021; Golden Visas 2021), and a lack of taxation, the country has attracted crypto-entrepreneurs wishing to escape "a volatile world" into a Pacific paradise (Bach, 2017 in Jutel 2021). In 2017, Vanuatuan passports could be bought for "only 44 Bitcoin" (Bach, 2017). This ensued a pressure from anti money-laundering authorities that resulted in the Vanuatu Government dissuading its citizens from engaging in cryptocurrency-related trade. Beyond this, Vanuatu has also become the locus of Oxfam's blockchain powered project for a cash distribution disaster aid (Jutel 2021), which by Oxfam's own reports has failed to achieve the expected transparency and disintermediation. The program's failure is attributed, among other reasons, to the users' (the aid beneficiaries) lack of understanding and technological skills. The people and their government are framed as the setback in the implementation of technological solutions.

Finally, Fiji is framed as the locus of a US State Department conference that included many presentations about the potential use of blockchain for elections, energy distribution, supply chains and sustainable development; even a WWF presentation titled "Can Blockchain Save the Planet?" (Jutel 2021). A culmination of this Tech Camp event was the implementation of a blockchain supply chain observation system for tuna fishing. The system aimed to provide a traceable record for tuna products and would further aggregate ethically committed fisheries, boats, retailers and middlemen into a blockchain platform. Apart from having all excluded parties deemed ethically condemnable by design, local materialities and performances prevented the large-scale integration of blockchain into the lifecycle of this trade. The costs for operating and maintaining the system were too high, putting the Fiji government at a disadvantage as the foreign market (mainly the US) would push to make blockchain supply tracing mandatory (Jutel 2021).

Summing up, the narratives that support blockchain integration of fundamental economic sectors or state governance are altogether obscuring the power imbalance between users or beneficiaries of blockchain platforms and infrastructure holders. Transferring aspirations of democratic governance and the protection of fundamental rights to blockchain solutionism, creates the predicament of a shift of control from the previous centres of power to the oligarchy of platform owners. This oligarchy enjoys the ability to justify inequalities in

accessing resources or fundamental rights such as migration rights, over the “transparency and efficiency” of a blockchain enabled system (either being justified via reputation, financial transaction auditing or biometrics). An ability which is not limited by democratic control (Jutel 2021). Though not immediately blockchain powered, China’s citizen reputation system is a good example of this (Wong and Dobson 2019; Hansen and Weiskopf 2019; Shahin and Zheng 2019). The struggle for democratic control is intertwined with the struggle for the control of infrastructure (O’Dwyer 2015)

Representations of Blockchain in the Greek Media

After having discussed the narratives of universality, solutionism and progress associated with blockchain technology, we proceed with reviewing the prominence of said narratives in the representations of blockchain in the Greek media – or absence thereof.

In searching for elements of historic representations, we shall first categorise the articles by year. In total, the primary literature consists of 6 articles from 2016, 11 articles from 2017, 28 articles from 2018, 22 articles from 2019, 11 articles from 2020 and 22 articles from 2021, for a total of 100 articles. This can be interpreted as expected because, by 2016, the application of blockchain technology was still pretty fresh for the interests of the general public globally, and shows some correspondence to the volatility of the price of bitcoin (Best 2021). Our data, however, are rather inconclusive towards the definite framing of such a correlation because the article sample is by design formed to exclude bitcoin-only resources when possible. There are also two sets of two articles – *Avgi* 2019b and *Kontranews* 2019a; *Naftemporiki* 2021a and *Efsyn* 2021a – in which different newspapers reproduce the same or nearly the same content. I have chosen to allow this duplicity, as it emphasises the choices of narratives and framing of blockchain technology as prioritized by the media in question.

Understanding or framing of blockchain through bitcoin and cryptocurrencies

Our first observation concerns the representations of blockchain technology beyond and away from cryptocurrencies. Here we can confidently assert that, in a sample that actively tried to limit the references to bitcoin as an implementation of blockchain technology, having 37 out of 100 articles (37%) mention or even explain bitcoin clearly shows the impact of this implementation as the dominant example of blockchain-enabled network application. Similarly, 37 out of 100 articles also mention cryptocurrencies in general or specific cryptocurrency examples (excluding bitcoin or including bitcoin among others). Of the 37 articles, 13 do not mention Bitcoin at all, making the total number of unique articles that frame blockchain technologies with respect to cryptocurrencies amount to exactly 50 out of 100 (50%). Of the articles that explicitly mention bitcoin: 1 is from 2016, 7 from 2017, 17 from 2018, 2 from 2019, 2 from 2020 and 8 from 2021. Of those that mention cryptocurrencies, we have another 1 in 2016, another 3 in 2018, another 4 in 2019, 3 in 2020 and an additional 2 in 2021.

The totals are as follows: 2016 having 2 articles, 2017 having 7, 2018 having 20, 2019 having 6, 2020 having 5 and 2021 having 10. Comparing this number to the total number of articles by year, the following insight can be acquired: 2 out of 6 articles in 2016 mention

cryptocurrencies alongside blockchain (33%), 7 out of 11 2017 articles do the same (64%), 20 out of 28 (71%) in 2018, 6 out of 22 (27%) in 2019, 5 out of 11 (45%) in 2020 and 10 out of 22 (also 45%) in 2021. This makes 2018 the year when blockchain was being overwhelmingly associated with and represented by cryptocurrencies in the Greek press.

But? What is Blockchain?

There is also the issue of popular understanding of blockchain technology as represented in the Greek media. Of the 100 articles, 16 actively provide some context as to what blockchain technology consists of. Out of these 16, 3 articles frame it as the technology that enables cryptocurrencies while not attempting a more in-depth analysis. Of the remaining 13, 5 articles provide somewhat adequate explanations of it being akin to a ledger or a database, with mentions to the qualities that differentiate it from previous similar technologies.

The remaining 8, one of which is the editorial, give explanations detailed enough to explain the general concepts so that a layperson could understand the functions and cryptography to follow the basic concepts of a blockchain discussion among experts. The majority of these articles are from 2018 (9 articles), 3 are from 2017, 2 from 2021 (of which one is the editorial), 1 from 2019 and the final one is from 2020. This either coincides with a point in time when information about blockchain implementations was more widely available beyond expert circles or, though not mutually exclusive with the previous possibility, a point in time when blockchain narratives framed this technology as more than a passing trend and, thus, worthy of the general public's attention .

Similarly with the previously mentioned categorisation, when examining the articles by year: of the 11 2017 articles, 3 (27%) give some context as to what a blockchain is. In 2018 the number is 9 out of 28 (32%), 1 out of 22 (4,5%) for 2019, 1 out of 11 (9%) for 2020 and 2 out of 22 (9%) for 2021. It is somewhat safe to assume that the writers suspected that the public, which would find value in the majority of blockchain-related articles, would have an understanding of the relevant technology. However, when discussed along the following prevalent narratives and metrics, this seems to add to the mystification of blockchain technology and its framing as a "miracle" technology.

Blockchain, an innovation like any other?

Another interesting clue as to the historic course of blockchain narratives in the Greek press is its framing among other contemporary technologies collectively addressed as the bleeding edge of what was going on, followed by the narratives on the universality of technology and general progress. The technologies frequently mentioned in the same sentence that introduced "blockchain" to the articles are: *Artificial Intelligence* (or the more technical term *Machine Learning*; sometimes both, one next to the other), *Internet of Things*, *5th Generation Internet*, and to a lesser extent *3D Printing* or *chat bots*. Of the total 100 articles, 21 perform this framing of exploring blockchain among these other technologies. Of those 21, 4 are from 2016, 4 from 2018, 7 from 2019, 2 from 2020 and 4 from 2021. Their relative percentages by year are 67% in 2016, 0 in 2017, 14% in 2018, 32% in 2019, 18% in 2020 and, similarly, 18% in 2021. Of these articles, only 1 (*Avgi* 2018a) tries to explain blockchain and does so through cryptocurrencies.

Imaginaries of the 4th Industrial Revolution

One very conspicuous reference made in some articles (7%) is to the 4th Industrial Revolution. Two 2019 articles and one 2021 article explicitly name it “the 4th Industrial Revolution” in association to blockchain, while two others refer to it a bit more vaguely as “revolution”. Two instances – the similar *Efsyn* (2021a) and *Naftemporiki* (2021a) articles – concern the initiatives pertaining to the technological transformation of the Greek Island of Astypalaia, an initiative that alludes to the 4th industrial revolution by the appropriate name “Astypalaia 4.0”.

What this 4th Industrial Revolution consists of is never elaborated upon in any of these articles. What is contained in the articles are promises on the universality of progress, the efficiency of governance, the boost on competition and the transformation of business. What those changes entail, who are the actors that bring about those changes and what is the impact of said transformation and competition is obfuscated but certainly framed as ethical, rational and rationally inevitable and empowering. However, who will be empowered is usually missing, and, when present, the subject is either an organisation, the state, an enterprise, or an inference of humanity as a whole, as we shall see below.

Finally, among the previously referenced articles, 1 from 2019 (*Avgi* 2019a) describes blockchain as the “Internet of the Future", thereby tying the aforementioned imaginaries together.

Suppliers of the narratives

When examining the source of most of these intermediations to Blockchain technology – especially those with imaginaries of universal progress or disruption – most articles supply us with the reports of organisations, big tech companies and banks. This is expected, given that the institutions immediately challenged by blockchain technology (as per the cyberpunk narratives) are big tech and the traditional centres of finance. What was not expected was the prevalence of PricewaterhouseCoopers (PwC), an audit, consulting and assurance firm (5 articles) alongside Deloitte (5 articles). Accenture falls behind at only 1 article, while JP Morgan is mentioned in 3.

Other institutions whose frame or actions are voiced in various points along the articles include: banks; of those in Greece, the National Bank of Greece is mentioned in 5 articles, Eurobank in 2 articles, and the Central Bank of Greece in 1 article. Globally, the European Central Bank is found in 5 articles, the Bank of France in 2 articles, the Bank of England in 2, and the Bank of Canada in 1 article. Of the commercial banks, BNP Paribas is mentioned in 1 article, the Commonwealth Bank of Australia in 1 article, Deutsche Bank in 2.

Tech companies also play an important role in the framing of this technology in the Greek media. Facebook is mentioned in 3 articles, Twitter in 1, Google in 2, Amazon in 2, IBM in 3, Oracle in 4, while Microsoft, Hewlett-Packard, Lenovo and Motorola are each found in 1 article. Tesla and the company’s CEO, Elon Musk, seem to have enticed some bitcoin-related articles (4 in total). Multinational pharmaceutical Bayer is also mentioned in 2 articles that touch on blockchain applications in the health sector.

Most of these articles narratively frame blockchain as the means to progress and prosperity, while very few attempt a critique. When these are on the critical side, the framing is almost exhaustively towards bitcoin as either unsafe from an investing standpoint or enabling criminal activity.

This is more pronounced in articles that voice the opinions of individuals. For Nikos Pappas (Pappas 2017), then-minister of Digital Policy and Telecommunications of the Syriza-

ANEL coalition, blockchain is one of the transformative technologies that the government must both regulate free access to but also – more importantly – protect citizens from. In the same mindset, Yanis Varoufakis (*Efsyn* 2017b), head of DiEM25, praises the potential of blockchain applications to empower unique solutions in terms of trust but claims bitcoin to be "the perfect bubble" and, thus, perilous. He even compares bitcoin boom with the Dutch Tulip Mania. Vasileios Mpokos and Giannis Dalmas (Mpokos and Dalmas 2019), members of KINAL Party, envision blockchain as part of the central technologies of what they refer to as "Datakapitalismus", at the forefront of the "Fourth Industrial Revolution". Blockchain and other technologies (such as 3D printing and AI) can either prove detrimental to an already waning middle class or prove to be reinvigorating. They urge for political action to be taken to ensure the latter. The Governor of the Bank of Greece, Giannis Stournaras, frames blockchain as a means to achieve greater efficiency for organisations but claims cryptocurrencies to be "a negative development" (*Naftemporiki* 2019d). Furthermore, the then President of the European Central Bank, Mario Draghi, cites that it is beyond the regulatory capacity of the ECB to regulate bitcoin (*Kontranews* 2018b), which is framed as fraudulent and unstable. In the same 2019 article, Draghi also dissuades citizens from investing in bitcoin. By contrast, Kyriakos Pierakakis, minister of Digital Governance of the Nea Dimokratia government, frames blockchain as the facilitator for the creation of national identity management infrastructures (*Efsyn* 2020c).

"Thou shalt not possess any bitcoin"

When interaction with the technology is unmediated by the traditional institutions (banks, the state, big tech companies), the framing of blockchain applications and, explicitly, cryptocurrencies is strongly framed as dangerous or criminal by the majority of articles, even beyond the voices of spokespersons of the aforementioned institutions.

Of the 100 articles analysed, 13 actively portray bitcoin and cryptocurrencies in a negative light. In an article titled "Bitcoin and criminality" it is explained that, because of the pseudonymity between transacting parties, bitcoin is akin to divine providence for "embezzlers, tax evaders, thieves, arms dealers, drug dealers, assassins, the mafia, and other criminals big and small" (Michalis 2018). The same article further mentions the closing of the website Silk Road by the FBI. The website was used by many people to purchase illegal substances during its activity. The article further associates the volatility of the price of bitcoin with said criminal activity and goes further to mention a study from the University of Sydney and the University of Technology of Sydney, without providing a citation, which claims that one in every four individuals possessing bitcoin are dabbling "in drug dealing, hacking, illegal pornography and money laundering" (Michalis 2018). The mentioned research can possibly be "Sex, Drugs, and Bitcoin: How Much Illegal Activity Is Financed Through Cryptocurrencies?" (Foley et al. 2018); however, the article does not explicitly provide further information.

The narrative of the fraudulent nature of cryptocurrencies also is prevalent in the articles on Dogecoin, a cryptocurrency that attracted publicity both because of its explosive growth and subsequent fall as well as the involvement of Elon Musk, with the Tesla CEO reportedly alluding to Dogecoin being a confidence con on buyers' money (Michalis 2021b). The other Dogecoin-related article shares the position of Jackson Palmer, one of the creators of the cryptocurrency, whose stance on the matter is that the crypto-market is "run by a cartel of celebrities" using social media influencers to leverage the market in speculation of greater profit at the expense "of the desperate and naive" (*Kathimerini* 2021).

This framing is intensely indicative of the constructed interpretative distance about the technology that is created by the mediations of experts (Reijers and Coeckelbergh 2016; Poppe 2016) and reproduced by the media, here dissuading an unmediated interaction with the technology by purposefully associating ethical qualities to it.

The Narrative Qualities of Blockchain Innovation

The articles that do not attempt to provide a critique on blockchain through bitcoin uncertainties or attribute to it the enabling of criminal activity, narratively frame blockchain technology as the new big thing. They usually illustrate this claim by presenting the attributed inherent qualities of a blockchain system: *transparency, security, immutability* and, most of all, *efficiency*. Though it is not always apparent how these qualities can be achieved by including blockchains to existing systems. Especially as far as *efficiency* is concerned – when compared to how energy consumptive blockchains with proof-of-work consensus algorithms are in general. Furthermore, as far as *security* and *trustworthiness* are concerned, when positive blockchain framings are contrasted with the narratives of a criminality enabling technology.

Of the qualities attributed to the blockchains, *efficiency* (17 articles) and *security* (16 articles) are the most prevalent. Innate *transparency* comes next at 11 articles followed by a belief in the technology's *trustworthiness* (9 articles). The *decentralised design* is considered, in itself, a quality in 10 articles, as well as *immutability* in 7 articles. Lastly, 4 articles claim blockchain to be a means towards a more sustainable development in digital systems. This is also in accord with the secondary literature, as according to Kostakis and Giotitsas (2014 in Reijers and Coeckelbergh 2016) the main feature of the blockchain is to safeguard against counterfeiting and fraud.

However, the imaginaries of a "miracle" technology are not limited to the aforementioned qualities attributed to the blockchains. Particular emphasis should be placed on some articles that further explicitly mirror the issues of the secondary literature and have not already been dissected. In the *Naftemporiki* article titled "Blockchain and Greece's opportunity" ("Το blockchain και η ευκαιρία της Ελλάδας") we find a belief in this technology being central to a new future paradigm of economy based entirely on smart contracts, with the potential to make "existing networks and infrastructures, and maybe national currency" obsolete (Aslanis 2018). The same article also claims that most governments have planned to adopt this technology in governance and, furthermore, urges the Greek government to "follow the example of Malta" and give tax incentives to large fintech companies to operate in the country. The article goes further to elaborate upon how this opportunity is envisioned:

> Our country is among the countries with the largest access to sunlight, while simultaneously having a lot of unexploited empty buildings due to the crisis. Bitcoin requires huge amounts of energy reserves to support the computational machines that do the mining. Colossal companies that invest in Bitcoin Farms move close to hydroelectric dams or even change countries in search of cheap energy. Much like data centres, our country might as well create a legal framework to receive companies that would invest in Bitcoin Farms and, in this way, sell energy, create jobs and put our country on the map of blockchain infrastructure. (Aslanis 2018)

Similarities with Jutel's (2021) cases of the imaginaries of progress in the Pacific are striking and can also be found in the Pantzou (2018) article in *Efsyn*, "Plastic as the social coin" ("Το πλαστικό ως κοινωνικό νόμισμα"). That article covers the NGO "Plastic Bank" (Plastic Bank

2021), founded in 2013 in Canada. The NGO rewards the collectors of plastic trash in shores or rivers. Plastic Bank's pilot was in Tahiti, where collectors would deposit the trash they accumulated in one of the 30 recycle centres constructed for this purpose. The collectors would either get compensated in cash or in a cryptocurrency that would allow them to access goods and services like "biofuel for their households or tuition fees for their children in some schools that partake in the initiative" (Pantzou 2018). The circumvention of state and traditional infrastructure, or the lack thereof, and the reduction of the political issues of the citizens in favour of technological solutionism (Jutel 2021) become even more apparent in IBM's interest in the Plastic Bank. The company aims to provide the beneficiaries of Plastic Bank with a digital wallet, while, reportedly, these populations have no means to access the traditional banking sector. The Bank is further mentioned to operate in the Philippines and expand in Indonesia and Brazil (Pantzou 2018). Lastly, the article measures the impact of the NGO by means of the founders being invited by the Pope and being awarded by the UN for their contributions.

The narrative of the universal benefits of technology also saturates the articles that focus on blockchain qualities. Good examples can be found in articles like "Decentralized 2019: Blockchain technology concerns us all" (*Efsyn* 2019e) in which we find:

> We look forward to the continuation of our collaboration with all of you in any way, shape or form, so as to push societies – and humanity as a whole – even further. (*Efsyn* 2019e)

This quotation comes from Antonis Polemitis, CEO of the University of Nicosia, in his speech at the blockchain-focused conference "Decentralised 2019" as transcribed by the newspaper (*Efsyn* 2019e). Mr. Polemitis and the University of Nicosia will be mentioned again below as they are a frequent source of narratives of blockchain technology among the articles of the dataset.

On the legal ramifications and the renegotiation of "truth" (Jutel 2021; O'Dwyer 2015; Reijers and Coeckelbergh 2016), we have imaginaries of the diminishment in the needs for expert opinion in courts as "the judge would verify the validity of evidence without the help of experts because all records in open blockchain databases are public and available" (Logaras 2018). Also in the same article, reportedly, because of smart contracts' enforced execution when conditions are met, less appeals to litigation will be made by parties wishing to enforce contracts. The legal issues mentioned in Schrepel (2019) – such as the limit of the rule of law's inability to assert citizen rights in smart contract mediated agreements – are absent. Instead, the dominant narrative being that the state and legal system will conform to the technology and not the other way around.

Imaginaries of Health; Healthcare; and Self-sovereignty

Blockchain applications to health exist – at least as mentions – in 11 articles. Of those, the earliest (*Efsyn* 2017a) mentions that blockchains are already in use in "Big Hospitals" – which are, presumably, franchises of privately-owned clinics – without any further details as to where and which. Subsequent articles mention benefits from implementing blockchains in healthcare (*Kontranews* 2018a), usually implying economic benefits from increased efficiency (*Kathimerini* 2020; *Naftemporiki* 2020c). An important piece of insight comes from an article on Bayer (Efsyn 2020d) which comments on the multinational pharmaceutical's vision for "health and food for all". Bayer aims to muster blockchain technology to further telemedicine

and individualised healthcare with benefits in areas including behavioural health, mental health and wellbeing. In their own words, blockchain technology would enable "individuals to efficiently assume the responsibility of their own personal healthcare" (*Efsyn* 2020d) – although, again, the specific nature of improvements actualised by blockchains is not provided, along with more definite content as to what behavioural health, mental health and wellbeing would entail. Bayer's take on food is found in another article (*Naftemporiki* 2020b) and it consists of a blockchain-empowered global platform for agricultural product quality, possibly promoting specific production schemas and excluding producers that cannot conform to the standardised practices or shoulder the cost of compliance to the platform – similarly to the tuna example in Jutel (2021).

The narrative on individualised health services is found again in further articles (*Rizospastis* 2018c; *Kontranews* 2018c) culminating in a more concrete vision of "personal health cards" that would store the entirety of a patient's history, use technologies to implement "smart diagnosis" (possibly automated, with minimal involvement by medical professionals or entirely without them) and, then, elicit "trends" in health from analysing aggregated health histories via big data algorithms (*Kontranews* 2018e). Finally, another vision related to the aforementioned personalisation of healthcare services through technology – namely merging healthcare with COVID-19-related policy – can be found in a *Naftemporiki* article (2021h). This article explains how the Blockchain Center of Catalonia issued a temporary digital pass to individuals that proved to be not infected with COVID, which allowed them to participate in live music events or visit up to five restaurants amidst the related lockdowns.

Imaginaries for Research, Academia and possibly Science

Another interesting find in the sample of 100 articles was the relative prominence of the University of Nicosia, Cyprus (8 articles) when compared to other universities like Panteion University (*To Vima* 2018e) or Athens University of Economics and Business (*Naftemporiki* 2021g) – with one reference each – and IST College (*Efsyn* 2016a), MIT, Stanford, Princeton, UCL (Panagopoulou 2018) or the Technical University of Berlin (*Naftemporiki* 2021k), also with 1 reference each. Of the 8 articles on the University of Nicosia, 7 (*Efsyn* 2017a; *Kathimerini* 2017; Panagopoulou 2018; *Kathimerini* 2018b; *Avgi* 2019a; *Efsyn* 2019e; *Naftemporiki* 2021c) mention it as the first institution to create a blockchain-centered syllabus or, otherwise, the first to do pioneer work in the field. 2 articles (Panagopoulou 2018; *Kathimerini* 2017) mention it in reference to its blockchain-authenticated academic titles. Furthermore, in one of them (*Efsyn* 2017a) there is an interview of Dr. Christos Vlachos, Economic Director and member of the board of directors of the university, while 4 convey the statements of Antonis Polemitis (*Kathimerini* 2017; *Kathimerini* 2018b; Panagopoulou 2018; *Naftemporiki* 2021c) with the title CEO (sic) of the University of Nicosia. In the transcription of the words of A. Polemitis:

> Our role as a university focuses on the front lines of these technological changes, both in theory and application. I am very proud of the work that is done by our research team. [...] We are looking forward to the discussion of all these matters with our colleagues that are from academia, business representatives and the rest of the blockchain expert community. (*Kathimerini* 2017)

The above statement, as well as the fact that academic research is represented by the Economic Director and the CEO of the university, is descriptive of a specific imaginary about

the socialities, hierarchies and power relations, which is expected to appeal to blockchain technology-interested parties – at least, as so chosen in the University of Nicosia's publicity strategy. Also, further examples of this can be found in this segment from the speech of Eric van Miltenburg, Chief Business Officer of Ripple, regarding Ripple's collaboration with the University of Nicosia:

> Academia has as per tradition been the mover of technological innovation. The University Blockchain Research Initiative is a recognition of the immense significance and special role that universities play in developing the understanding and applications of cryptography and blockchain technology. It addresses the needs of today, as the graduates will supply an ever-growing and mature financial market, and its need for workforce. (*Kathimerini* 2018b)

The University of Nicosia is also stated to publish Hash fingerprints of the awarded academic titles to students who complete their studies in Bitcoin's blockchain. This is framed as innovatively allowing students and potential employers to ascertain the validity of such titles, although the exact prevalence and metrics on the phenomenon of academic title forgery is not mentioned in any of the articles.

Concluding Remarks

The various conflicting narratives about blockchain – simultaneously, a) being narrated as a "miracle" technology that will change markets, institutions and governance (Reijers and Coeckelbergh 2016), b) being unique in providing *transparency*, *security*, *trust* and *disintermediation* but c) frequently lost among mentions of Big Data, AI, 3D printing and 5G networks or d) being branded as *unsafe*, *fraudulent* and *enabling criminal activity* worldwide through cryptocurrencies – increase in different measures the interpretive distance among programmers, policy makers, industry representatives and, more importantly, citizens. This aggregate of contradictory elements is aiding in the absolute mystification of the technology – at least, in what representations are observed in the Greek media.

Initiatives that further the public understanding of this technology by bringing experts and non-experts together to interact on equal grounds are not unheard of in Greece: for example, the 2018 festival "Blockchain Utopia or U-turn" that took place in Athens (Onassis Stegi 2018). The festival included a variety of presentations by a diverse cast of actors, including blockchain enthusiasts, climate activists, musicians, lawyers, academics and journalists among others. It included a lexicon of terms frequently used in blockchain-related conversations, with its brochure even providing some references to introductory works in order for the attendants to make the most out of the event. The event also represented the critical and utopian positions of conflicting blockchain imaginaries in sufficient detail. No mention of this event was found in the Greek media included to the sample of this analysis, for which no adequate justification can be provided. Impressively enough, the tabloid *Proto Thema ("Πρώτο Θέμα")*, which I have chosen to exclude from the dataset, has a brief article on the matter (*Proto Thema* 2019) which features all the tropes regarding the 4th Industrial Revolution.

The interpretive distance created in these articles appear to mirror the policies and agendas of the various narrative providers. As stated by Marzantowicz, CEE and head of Blockchain Scouting Group of IBM: "Technology companies can better understand the

technology because it stands at the core of their entrepreneurial operation" (Emmanouil 2020). This statement can be interpreted as inferring that the unmediated relationship with blockchain technology should remain the purview of industry leaders and – supported by the various interviews of governmental and non-governmental benchmarkers alike (like Stournaras, Varoufakis, Pappas) – the state should make efforts mediating this technology to save the citizens from its perils.

In Ricœur's model of "prefigured time", "configured time" and "refigured time" – as found in Reijers and Coeckelberg (2016) – the non-expert citizen reader learns about the existence of the technology and curiously begins searching for context by interacting with the texts (*prefigured time*). Then, by becoming acquainted with the meditations of the media, their context changes to include the aforementioned narratives as realities on the potential of the technology and its uses (*configurement*). Finally, as these narratives are digested, the readers become partakers of the social values of the narratives, by which values they are expected to be proactive in their various subsequent interactions with mentions or towards applications of blockchain technology (*refigured time*). Because we can assume that the non-expert reader has no previous knowledge of cryptography, coding or the other related disciplines, these narratives possibly shape the core of their understanding on the matter and help to reinforce and maintain their interpretations about the technology.

The distance between the various narratives (about the technology and narratives of actors using the technology) and what issues, facts or experiences are legitimately obfuscated by them, is saturating the articles one way or another; resulting in the emplotment of what is proposed as ethical and what is implemented via blockchain. In these articles, one can find examples of a state expected to act patronisingly towards citizens, while simultaneously opting for technocratic solutions over politics, discourse, involvement and investment. Yet, emplotment goes further, as blockchain technology is narrated to have agency by itself to stand in place of (and enforce) the "Truth". For example, in ascertaining property rights, or the validity of academic titles, discerning what is quality tuna products from those of substandard quality, answering what products are produced by unethical means, or even, mediating which societal imaginaries about forests matter and which will be cast to oblivion. Emplotment is also found in the potentials of social structure as configured by the forced execution of smart contracts in governance and beyond its limitations. The "inefficient" *democratic state* adopts the industry's technocratic pragmatism to transcend what is narrated as its shortfalls, opting for blockchain enabled efficient solutions.

However, it is important to note that, on the matter of interpretive distance, Poppe (2016) stands critical to Coeckelberg – one of the authors of the founding publication of this work – claiming that interpretive distance is chosen as a more convenient analytical tool than power inequalities. For example, the unequal power between policy makers alongside industry representatives and citizens who are experiencing the choices made for them, in their absence, sometimes even erasing their agency in the process (Jutel 2021).

Nonetheless, what is apparent from even a superficial examination of the articles is the still volatile status of this technology as created by the various socialities that it can configure as conflicting parties of the old regimes (banks, governments, Big Tech) and activists, hackers and political collectives struggle for the prevalence of their imaginaries of ideal futures. In support of messy democratic processes versus the totalitarianism of technocratic governance, one can only recognise the importance of O'Dwyer's (2016) call for us to engage in community building in parallel with technical solutions, foster trust, negotiate hierarchies and embrace difference.

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