Metaphorical Correspondences Between Law and Data

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Abstract

This study proposes a new lens for thinking about data law by combining legal semiotics with metaphor. It begins by questioning how legal systems represent data which can be referred to as an entity that is inherently shifting, relational, and abstract. Hence, metaphor is used not just for illustration, but as a method for rethinking legal meaning itself. Drawing from classical exegetic traditions and contemporary legal theory, the paper shows how interpretive flexibility can help navigate emerging challenges, particularly in contexts like that of blockchain technology. Here, legal concepts often fall short, given the transnational, decentralised nature of digital transactions. By resorting to devices like Broekman's concept of *conversion* and the logic of differential calculus, the paper suggests ways legal meaning can adapt without losing coherence. In doing so, it offers a framework for transposing traditional legal principles into the infosphere; one that protects rights and preserves dignity, while acknowledging the fluid, interconnected nature of data in rapidly evolving social and technological landscapes.

Keywords Data · Legal semiotics · Metaphors · Legal concepts · Antinomies

1 Introduction

This paper employs legal semiotics and metaphors to propose a new theoretical approach for reconciling conflicts and addressing regulatory gaps related to data and the law (Sect. 3). In that regard, blockchain technology serves as a reference through which these transformative shifts are examined (Sect. 2). The paper takes a critical approach to examining the concept of representation through metaphors within the legal context of data. It does so with two main objectives. First, it explores the notion of representation and key legal concepts. Second, it uses these insights to build a foundation for analysing how data can be legally interpreted,

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considering its abstract, flexible, and often ambiguous nature (cf. art. 4 GDPR). This perspective aims to clarify complex issues, such as algorithmic determinism, representational harm, and biases in automated decision-making.

Methodologically, the paper approaches law as a transformative language. Similarly, it approaches technologies semiotically, as if a (legal) text with narrative. That is because writing and data can be understood as forms of inscription of the self in the world.

Its goal is to offer a theoretical perspective on data law by expanding on established ideas within legal theory. In this context, data is approached as a subject for new metaphors, allowing for the adaptation of legal principles that protect fundamental rights, with a focus on dignity and freedom.

This approach serves a dual purpose. On one hand, it supports the principled evolution of data law. On the other, it helps mitigate tensions between legal language, data, and technological advancements. Additionally, by considering data as a set of terms or components, the paper connects this to the concept of rights as a way of expressing outcomes [41]. It draws on metaphor as a model of the world [22] and leverages the idea of language as a hierarchy of constraints [36] to shape the fluid nature of data within legal narratives.

To support these arguments, the paper references Medieval legal exegetic techniques, highlighting their flexible and context-sensitive interpretive methods as a model for addressing modern legal challenges (Sect. 3).

Building on the preceding discussion, this paper continues to explore the implications of decentralised networks for legal theory by examining the conceptual challenges posed by blockchain technology. Specifically, it investigates how established legal principles can be reinterpreted through metaphors that resonate with the decentralised and transnational nature of blockchain systems. This approach is anchored in Broekman's concept of *conversion* (Broekman 2023), which is paired with the functioning of differential calculus to offer a dynamic framework for legal interpretation in the infosphere (Sect. 5).

This methodological approach responds to the urgent need for legal frameworks that can adapt to the dynamic and decentralised nature of digital environments. Traditional legal systems, which are based on territorial sovereignty and state-centric governance, often struggle to address the complexities of blockchain transactions, which transcend national borders and lack central authority. By using metaphors to transpose legal concepts into the decentralised context of blockchain technology, this paper aims to bridge this gap and provide new methodological tools when it comes to the analogy-based reasoning used by courts when dealing with inherently immaterial assets [47]. That is because metaphors serve as means to reconfigure our understanding of the world, introducing a conceptual breach within the rigid structures of legal categories shaped exclusively by a brick-and-mortar reality. In so doing, metaphors create a distinct form of referential meaning, not by indicating something already established, but by conveying the possibility of new interpretations. Within metaphors, '[T]he same' operates in spite of 'the different' [51] thereby pursuing the concordant (i.e. coherence in legal reasoning) across the discordant (i.e. the inherently immaterial infosphere).

In this respect, the *Quoine* case serves as a key example, highlighting the legal ambiguities surrounding blockchain transactions. The case underscored the difficulty of applying traditional contract law to smart contracts, which autonomously execute predefined conditions without human intervention. This raises fundamental questions about contractual intent, enforceability, and liability. Additionally, the case illustrates the jurisdictional challenges posed by blockchain's transnational nature, as parties from different legal systems engage in decentralised transactions without a unified regulatory framework.

To address these issues, this paper proposes a novel approach that leverages the relational facet of data and legal institutions, enabling the translation of legal principles into metaphors suitable for the decentralised infosphere. By doing so, it aims to establish a more adaptable and context-sensitive legal framework that accommodates the evolving dynamics of digital assets and blockchain transactions.

This approach not only facilitates the principled evolution of data law but also minimises friction between traditional legal language and emerging technological realities. It promotes a more coherent and stable system of digital asset governance by acknowledging the semantic fluidity and legal complexity inherent in decentralised networks. Ultimately, the paper contributes to a broader understanding of how blockchain technology can be effectively regulated while preserving fundamental rights and ensuring dignity and freedom in digital transactions.

2 Blockchain Functioning and Crypto Assets

Under a practical standpoint, the functioning of the blockchain is further illustrated by how transactions and data are managed within the system.

Transactions and other information are periodically stored in digital blocks of fixed size, validated by mining nodes before being added to the blockchain. Then, each validating node holds copies of all or part of the blockchain on its servers. In an open and decentralized system, information is dispersed across multiple locations. Once data is recorded in a block, modifying it is nearly impossible unless a majority of validating nodes agree; an extremely unlikely event in a truly decentralized and anonymous network.[1] Cryptocurrencies, at the heart of all crypto asset definitions, including legislative ones [18], are digital representations of value [42]. These assets are generated through a process called mining [32] enabling direct peer-to-peer exchanges [66] while relying on cryptographic techniques to validate transactions.

Building on this technology, tokenization constitutes a significant innovation when it comes to the deployment of blockchain technology. More properly, tokenization refers to the process of converting rights into digital assets, commonly called tokens or coloured coins [30]. This is made possible through blockchain and smart contracts, which allow for customizable tokens that may be fungible, non-fungible, or even non-transferable, depending on their purpose [23].

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[1] Such occurrences have been rare, with one of the most well-known instances being the recovery of stolen tokens following the hack of the Decentralized Autonomous Organization (DAO) project on the Ethereum protocol.

For present purposes, Non-Fungible Tokens (NFTs) are of particular interest. They consist of unique sets of digital data recorded on a blockchain.[2]

This uniqueness is central to their legal and economic significance. Unlike cryptocurrencies, which are interchangeable and thus fungible, NFTs are singular by design; each carries a distinct identification code and metadata that renders it irreplaceable. Their non-fungible character enables precise ownership tracking, supports authentication, and facilitates the attachment of specific rights, such as access to services or entitlement to royalties. These attributes underpin their potential high valuation in digital markets. Moreover, NFTs may embed programmable functions, including but not limited to resale royalties or transfer restrictions, through smart contracts deployed on-chain [35].

The below illustration[3] exemplifies the uniqueness of NFTs as digital assets.
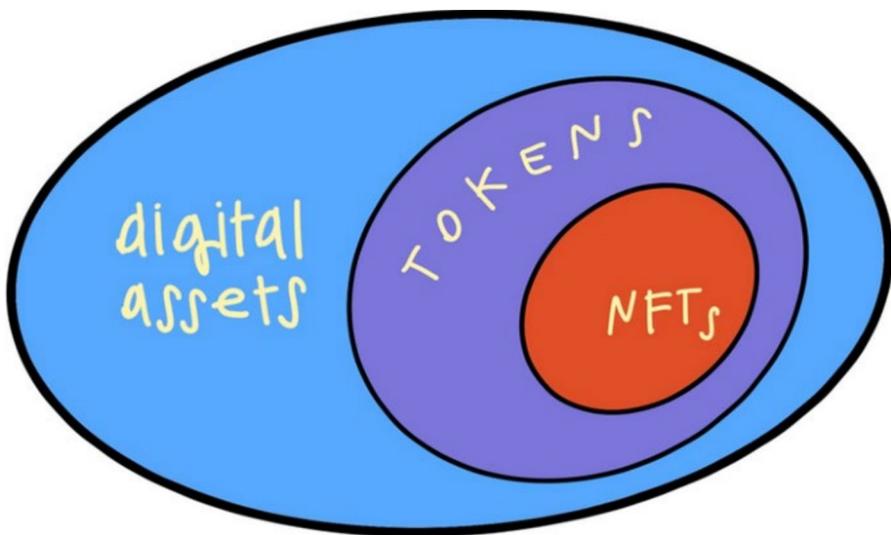
The concept of crypto assets emerged in 2008 when the pseudonymous Satoshi Nakamoto published a white paper introducing Bitcoin. It was described as 'a purely peer-to-peer version of electronic cash', allowing people to send payments directly without the need for a financial intermediary [53]. Since then, the concept has expanded significantly.

Despite their growing presence, crypto assets still lack a universally accepted definition. Terms like *crypto* and *digital* are sometimes used interchangeably, though in some contexts, *digital* refers to a broader category [38]. In contrast, the term *crypto* is derived from *cryptography*, the technology that secures transactions and ensures their validity.

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[2] A blockchain network is also commonly referred to as Distributed Ledger Technology (DLT).

[3] The illustration is by Isabella Blandino.

At its core, a crypto asset is a 'digital representation of value or rights which may be transferred and stored electronically, using distributed ledger technology or similar technology' [42]. These assets can be stored, transferred, and traded electronically. In that regard, some argue that blockchain disrupts traditional legal principles by challenging technological neutrality,[4] while others propose the idea of *lex cryptographia* [68] or suggest treating blockchain as an infrastructural common [17].

In line with this, it follows that 'untrusted members can interact verifiably with each other without the need for a trusted authority [10]'. Vividly, Reid Hoffman coined the expression 'trustless-trust'[64]. In his own words, 'on a blockchain network nothing is assumed to be trustworthy… except the output of the network itself' [64]. That is also related to two fundamental aspects of crypto assets. First, crypto assets exist exclusively in digital form [12]. Second, they rely on distributed ledger technology (DLT) or similar frameworks to manage transfers, maintain records, and provide secure storage. This architecture directly reflects Hoffman's trustless-trust. More properly, trust is not vested in any individual actor or central authority, but in the cryptographic and procedural design of the distributed ledger itself. Within such networks, every participant possesses a public key for encryption and a private key for decryption, enabling the execution of secure transactions between digital wallets [1]. In this connection, a distributed ledger works as a decentralized database, maintaining a comprehensive history of all past transactions. Once recorded, entries cannot be secretly altered, as each new transaction is linked to previous ones [13]. Concretely, this ensures transparency and security across the network.

Analogously, it descends that 'we have to be able to trust the blockchain, and to trust that no one controls it' [64].

These features reflect a deeper shift in the legal understanding of value when expressed through digital architectures. What follows develops this inquiry by exploring the normative implications of such a transformation, with particular attention to the possible development of established legal paradigms.

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[4] An illustrative example of these constraints can be found in De Filippi's analysis of drones governed by blockchain-based smart contracts. On March 6, 2016, a small drone in Russia executed a flight path dictated solely by a smart contract on the Ethereum blockchain. Once initiated, the contract could not be altered or stopped, even if the drone posed a danger. This case highlights the rigid and self-executing nature of blockchain-based automation, demonstrating how predetermined algorithmic functioning limits human intervention.

For further details s. [67].

3 Legal Paradigms Before Advances in Technology—Blockchain Technology and Algorithmic Determinism

With new advances in technology,[5] the legal discourse is confronted with unprecedented challenges brought about by rapid technological acceleration and disintermediation. In simpler terms, technological advances are reshaping how we interact, transact, and govern ourselves, posing new questions for traditional legal systems. For instance, in the United States, e-commerce sales penetration more than doubled to 35% in 2020 compared to the previous year, reflecting a decade's worth of growth compressed into a single year (McKinsey, 2020). This surge illustrates an increasing reliance on automated systems, smart contracts, and decentralised platforms that operate beyond conventional regulatory frameworks. Similarly, the global cryptocurrency market capitalisation grew from approximately $757.31 billion in 2020 to over $2.32 trillion by the end of 2021, emphasising the urgent need for legal systems to adapt to digital assets while addressing complex jurisdictional and enforcement challenges.

To navigate these challenges, it is essential to examine blockchain networks, which disrupt established legal paradigms due to their immaterial and a-territorial nature. This characteristic leads to disintermediation, where traditional middlemen (e.g. banks or brokers) are no longer necessary. At the same time, blockchain networks require new legal strategies due to their reliance on algorithmic functioning, which automates decision-making processes based on predefined rules and data. However, it is crucial to distinguish between blockchain networks and artificial intelligence (hereinafter AI), as both utilise algorithms but operate differently. Blockchain relies on deterministic algorithms that execute transactions and validate data through consensus mechanisms, ensuring security and transparency. Unlike AI, which learns and evolves over time as it processes new information, blockchain follows fixed rules and does not adapt to new data. Its algorithms are static and predictable, merely executing transactions and validating data without substantial changes.

The implications of blockchain's predetermined functionality can be seen in various real-world applications. For instance, in 2016, an autonomous drone was programmed to follow a pre-set route using a smart contract on the Ethereum blockchain. Unlike traditional drones that rely on human intervention for control, this drone executed its predefined trajectory without any possibility of alteration. Had the programmed route led it into an obstacle or endangered individuals, there would have been no way to override its course. This example underscores how blockchain

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[5] In his *The Fourth Industrial Revolution*, Klaus Schwab outlines current challenges and opportunities of our epoch. The below excerpts individuate some core aspects of our epoch.

'Of the many diverse and fascinating challenges we face today, the most intense and important is how to understand and shape the new technology revolution, which entails nothing less than a transformation of humankind'. […].

'The critical danger is that a hyperconnected world of rising inequality may lead to increasing fragmentation, segregation and social unrest, which in turn creates the conditions for violent extremism. The fourth industrial revolution will change the character of security threats while also influencing shifts of power, which are occurring both geographically, and from state to non–state actors. Faced with the rise of armed non–state actors within what is already an increasing complex geopolitical landscape, the prospect of establishing a common platform for collaboration around key international security challenges becomes a critical, if more demanding, challenge' [54].

technology enforces rigid automation, limiting human oversight and raising critical questions about responsibility and control in legal frameworks [67].

For the sake of clarity, blockchain networks fundamentally rely on algorithmic functioning to ensure security, transparency, and decentralisation. At their core, algorithms define the rules for processing data, verifying transactions, and achieving consensus among network participants. For instance, consensus algorithms like Proof of Work (PoW) or Proof of Stake (PoS) establish agreement across the network without a central authority. These algorithms coordinate the actions of distributed nodes (i.e. individual computers within the network) validating transactions and updating the blockchain ledger. Additionally, cryptographic algorithms secure data, protect user identities, and prevent tampering.

These elements highlight existing gaps in integrating technological advances within existing legal frameworks. In that regard, the *Quoine* case ([2020] SGCA(I) 02) epitomises these aspects. The dispute involved the Singapore-based cryptocurrency exchange *Quoine* and B2C2, a market maker, raising questions about applying traditional legal principles to digital assets. Specifically, the Singapore Court of Appeal examined whether cryptocurrency ownership is comparable to ownership of tangible assets without explicitly answering whether the automated nature of platforms can give rise to legal obligations.[6] In a nutshell, this decision illustrates the broader need to rethink property rights in the digital age. The case revealed

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[6] In concrete, the decision confirms an English case law's precedent holding that data inputs in a piece of software represent an offer. More precisely, *Thornton v Shoe Lane Parking* ([1970] EWCA Civ 2) revolved around the legal issue of whether an automated ticket dispensing machine's output, stating the cost of parking, could be deemed an offer, thereby creating a contractual obligation upon acceptance by a user who deposited the specified fee. The case confronted the ambiguity associated with ascertaining when a statement can be considered an offer, which is crucial for determining contractual validity. At the heart of the case lay the ambiguity of whether the machine's output constituted an offer or a mere invitation to treat. An invitation to treat is an expression of willingness to negotiate or an invitation for another party to make an offer, while an offer, when accepted, binds the offeror to a contract. The critical distinction between these concepts depends heavily on interpretation and context. Lord Denning, in his judgment in Thornton v Shoe Lane Parking, recognised the perplexing nature of offers, particularly in modern, automated contexts. He argued that the ticket machine's output was not an offer but an invitation to treat, suggesting that it merely indicated the parking price and invited potential users to make an offer by depositing the stipulated fee. This interpretation aligned with the idea that offers should emanate from human intention rather than automated processes. Lord Denning's approach highlighted the significance of context in determining whether an expression is an offer or an invitation to treat. However, Justice Blackburn offered a dissenting perspective. He contended that the machine's output, indicating the price for parking, should be regarded as an offer. His view emphasized the importance of clarity and predictability in contractual relationships, suggesting that an automated machine's statement, which is accepted by the user through the deposit of money, should create a binding contract. This dissent underscores the subjective and interpretive nature of defining an offer.

The ruling highlights the ever-present challenge in the field of contract law concerning the application of traditional principles to modern, technologically advanced contexts. The case raises questions about the adequacy of existing legal concepts, such as offers and invitations to treat, to adapt to the complexities of contemporary commerce.

In the case of *Thornton v Shoe Lane Parking*, the ambiguity of what constitutes an offer came to the forefront, highlighting the interpretive nature of legal principles in contract law. The distinction between an offer and an invitation to treat is not always clear-cut, and it often depends on the specific context and the court's interpretation. This case demonstrates the need for legal principles to evolve alongside technological advancements and novel commercial practices, maintaining their effectiveness in a rapidly changing legal landscape.

jurisdictional ambiguities since *Quoine*'s decentralised platform involved parties from multiple jurisdictions, complicating the application of traditional legal rules.

As outlined earlier, the decentralised structure of blockchain technology replaces centralised trust with a distributed consensus protocol, laying the groundwork for its legal implications.

Because individual participants work together to ensure that the blockchain is accurate and secure, it is not dependent on any central authority. As previously discussed, the notion of 'trustless-trust' reinforces the substitution of institutional guarantees with algorithmic coordination—an issue central to the legal paradigm shift examined below. As a result, this marks a significant shift from the current norm, where centralized financial institutions (e.g. banks) control ledger systems and validate transactions.

To grasp blockchain's legal implications, a concise exam on smart contracts will follow. They consist of self-executing pieces of software with terms directly written into code. According to Bloomberg Law, 'smart contracts rely on code deployed on a blockchain to automatically execute the terms of an agreement. This is where smart contracts begin to depart from traditional contracts, i.e., agreements embodying certain terms to be fulfilled by parties and given the force of law to incentivize performance' [34].

In view of this, smart contracts operate based on conditional logic automatically executing outcomes when certain conditions are met.

In this respect, let us consider the example of a tenant whose lease is governed by a blockchain-based smart contract. If the tenant fails to pay rent, the contract could automatically trigger an eviction by disabling the digital lock, preventing access to the apartment without any human intervention or legal oversight.

A particularly illustrative case is that of the blockchain-based company Slock.it, which developed Ethereum-enabled locks to facilitate the rental of physical assets (e.g. apartments or vehicles) without the need for traditional intermediaries. In this model, smart contracts were employed to autonomously manage rental terms, execute payments, and trigger access permissions, all within a decentralised infrastructure. While this technological configuration significantly enhances transactional efficiency, it is premised on an implicit assumption that the execution of smart contracts can replace conventional legal processes altogether. In particular, it presupposes that once a contract is deployed on-chain, its outcomes are self-executing, irreversible, and insulated from legal contestation. However, such an assumption abstracts away the nuanced and context-sensitive nature of contractual enforceability in modern legal systems. The reduction of legal relationships to executable code belies the interpretive frameworks through which law mediates consent, fairness, and accountability.

This scenario exemplifies a broader assumption embedded in blockchain-based agreements; that once a smart contract is executed, its outcomes are absolute, irreversible, and beyond legal contestation. However, this notion oversimplifies the law of obligations' functioning.

While smart contracts are designed to self-execute based on predefined terms, their enforceability remains subject to fundamental legal principles. Legal systems worldwide recognise that contracts can be rendered void or unenforceable if they

were entered into under duress, misrepresentation, or undue influence. Furthermore, consumer protection laws may invalidate contracts that impose unfair or unreasonable terms. The assumption that smart contracts operate in a legal vacuum neglects these critical considerations and adopts an overly rigid view of their enforceability.

Beyond enforceability, smart contracts introduce significant challenges related to liability and accountability. In a decentralised rental arrangement, for example, disputes regarding property damage present complex legal questions. Without a clearly defined legal framework governing these agreements, it is often unclear who bears responsibility when damages occur. The lack of identifiable contractual parties complicates the attribution of liability, making it difficult for insurance providers to process claims or assign fault. These issues expose the limitations of blockchain technology in addressing real-world legal concerns, particularly when its automated processes bypass traditional regulatory safeguards. This drift, shows how software-driven decision-making can operate autonomously, detached from broader legal principles and oversight. While automation enhances efficiency, it can simultaneously undermine fundamental rights such as due process and access to justice. In the case of smart contracts governing tenancy, state-enforced legal protections are replaced by self-executing code, prioritising efficiency over an adequate protection of rights [2].

To conclude, blockchain technology challenges established legal paradigms, questioning conventional notions. Its algorithmic nature, immateriality, and decentralised architecture demand new legal classifications and innovative regulatory approaches, necessitating a flexible legal framework. This paragraph has examined how blockchain's algorithmic functioning eschews traditional legal categories, calling for a requalification of legal concepts. With that in mind, the next section explores a cross-disciplinary approach, using metaphors to bridge the conceptual gap between legal discourse and technological advances. This perspective might offer a methodological alternative to understanding the complex relationship between law and Information and Communication Technologies (ICTs).

Reframing legal discourse as a dynamic interplay of relational and representational factors enables a deeper exploration of how law can adapt to the digital age. In turn, this approach has a twofold purpose. First, it does not only enhance our legal understanding of blockchain technology when approached under a legal semiotics' angle. Secondly, it does also contribute to critical data studies by examining legal principles under a new angle in a rapidly evolving technological landscape. After these preliminary remarks, the next paragraph will address the methodological potential for legal metaphors to harmonise the outlined shortcomings.

4 Metaphors as Legal Bridges Among Legal Institutions, Legal Concepts, and Data

This section explores how metaphors can bridge the gaps among legal institutions, legal concepts, and data, trying to offer a novel perspective on how legal systems can adapt to digital technologies like blockchain and smart contracts.

Overall, the argument builds on Wiener's definition of information as transcending conventional categories of matter and energy.[7] In this view, data are the basic building blocks of information, emphasising their relational nature.

Accordingly, data (such as personal data, defined in Article 4(1) of the GDPR as any information relating to an identified or identifiable natural person; or documents, described in the UK Civil Procedure Rules as anything in which information of any kind is recorded) should be understood as shaped through relationships. They are not fixed objects but take form through how information is collected, organised, and therefore interpreted. Their meaning depends on the legal, technical, and institutional settings in which they are used. In this way, data do not simply reflect facts but help produce the frameworks through which legal meaning takes shape.

For instance, tokens, documents, and banknotes may be referred to as pieces of data.

Each instantiate discrete yet overlapping modalities of inscription that mediate value as well as legal intelligibility. As artefacts, they are performative objects whose signification emerges not merely from what they represent but from how they are positioned within regimes of trust and circulation. More properly, tokens operationalise value through exclusionary recognition; their legitimacy depend on controlled access and embedded rule sets which are often cryptographically instantiated. By contrast, documents stabilise relations through recordation and reproducibility, allowing law to persist beyond presence and memory. Then, banknotes materialise state-backed assurances by combining symbolic and fiduciary layers. Thus, they embody institutionalised credit within a compact visual syntax.

Token	A token is a digital representation or symbolic placeholder. It stands for something else, often within a specific context. In the realm of cryptocurrencies, a token represents an asset that can be transferred between parties over the internet without requiring third-party authorization. Companies use tokens during Initial Coin Offerings (ICOs) to raise funds. These tokens grant investors ownership rights, dividends, or access to services. Unlike records and banknotes tokens are not physically; they exist virtually and facilitate transactions or interactions
Banknote	Banknotes and digital tokens both rely on unique identifiers for authentication, such as serial numbers for banknotes and cryptographic signatures for tokens. They use inscriptions or embedded codes to signify value, with banknotes displaying denominations and tokens having blockchain data. Both ensure security and prevent fraud through physical features in banknotes and cryptographic measures in tokens. Ownership is transferred physically for banknotes and digitally for tokens
Document	A record serves as a structured unit of data, akin to a snapshot capturing essential information. It embodies facts, transactions, or events within a database. In a relational context, each record corresponds to a row in a table, containing various attributes or fields. For instance, an employee record might include details like name, ID, salary, and hire date. These records form the backbone of organised data management

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[7] This proposition challenges entrenched dichotomies in physics and philosophy, asserting that information constitutes a distinct ontological category with unique properties. Wiener's groundbreaking insight has profound implications for fields ranging from information theory to quantum mechanics, prompting interdisciplinary inquiries into the fundamental nature of reality. Moreover, Wiener's delineation underscores the critical role of information exchange in modern communication systems, emphasizing the ethical imperatives of privacy, transparency, and data governance [65].

More properly, this relational perspective provides the rationale for examining the interconnected dynamics of property and contract law, as fundamental relation-based legal institutions.

In this respect, property and contract law both organize interactions and therefore relations as systems of governance. In following this line of reasoning, Singer defines property as 'relation[s] among people with regard to things' [59], therefore including intangible assets. This view extends property beyond mere ownership to a social framework governing interaction over valuable resources. When understood against the background of Global Value Chains [52] (hereinafter GVCs), this understanding is of particular relevance for blockchain networks.

VCs exemplify how contractual and spatial arrangements co-produce transnational legal orders. Much like the Smart City, which reimagines spatial coordinates through digitally mediated interactions [44], GVCs de-territorialise and re-territorialise normative space by linking actors, assets, and standards across jurisdictions. These chains are not reducible to mere trade routes. Instead, they emerge as webs of interlocking agreements that function as distributed regulatory frameworks. Each contract within a GVC becomes a site of norm production, embedding obligations and their fulfilment that transcend national boundaries. Just as the Smart City projects a spatial logic attuned to data aggregation and normative standardisation, so too do GVCs configure legal meaning through repetition, modularity, and chain-reactive enforceability. In this sense, both function as platforms for legal convergence, where relationality is operationalised as governance.

To continue, this line of reasoning aligns with the concept of a 'Fifth Estate' [19]. It captures how individuals engage with digital networks to access information and participate in civic life across jurisdictional and institutional boundaries. Just as the rise of the press in the Eighteenth Century was seen as establishing a 'Fourth Estate' the internet has enabled a further transformation of governance. Through platforms—including but not limited to mobile technologies and the social web—individuals now increasingly interact with services and institutions not by visiting physical sites (e.g. a courthouse). Rather, they enter digitally mediated 'spaces of flows' [19], where institutional functions and civic processes are distributed across nodes of a global infrastructure. This evolving ecosystem reconfigures traditional power structures and challenges the spatial assumptions inherent to established legal categories.

In this light, property is not just about control over assets but about organising relations among individuals. In parallel, contract law defines a contract as 'an agreement which creates, or is intended to create, a legal obligation between the parties to it [33]'. As well, this relational dimension is also evident when users agree to a software platform's terms of service, consenting to data collection and usage. Then, this contractual relationship establishes the platform's rights and the user's obligations, influencing societal interactions including but not limited to product development, targeted advertising, and personalized user experiences. From this relational viewpoint, data operate as nodes within complex social and economic networks. In turn, data collection and use create economic value but also pose social risks, transcending traditional proprietary and contractual dynamics. To continue, this duality

frames data not just as digital assets but as constitutive elements within systems of social relations.

In that regard, it could be fruitful referring to the notion of the trans-individual collective [49]. As Rantala suggests, drawing on Simondon [58], individuals are not merely participants in a network of relations but are constituted through those very relations, shaped by their co-evolution within a shared technical and social environment. In this context, blockchain fosters processes of collective becoming that exceed individual agency beyond linking users through transactions. Such a perspective invites a move beyond the zero-sum logic underpinning legal institutions, where rights are allocated through exclusion or competition.[8]

Instead, it points toward a legal understanding grounded in co-constitutive processes, where value, agency, and accountability emerge through mutual embeddedness in relational infrastructures.

Against this background, this perspective becomes particularly relevant when examining blockchain technology, which challenges conventional legal categories. From a legal standpoint, smart contracts are not inherently legal contracts, as without formal legal recognition or existence, they function solely as non-binding pieces of computer code. They gain legal relevance only when they establish 'normative means to regulate social behavior' [37], traditionally governed by legal systems. That is because this shift necessitates a new interpretive framework.

Interestingly, a comparative law perspective reveals intriguing parallels between blockchain networks and the system of writs in Medieval English law [27].

In that regard, writs were standardised legal instruments that connected human actions to judicial enforcement, enabling individuals to initiate legal proceedings. In a like manner, smart contracts on blockchain platforms similarly function as standardised digital tools that facilitate legal transactions. Just as writs formalized claims into legally enforceable formats, smart contracts transform real-world actions into executable digital codes. Writs relied on institutional enforcement for legitimacy, whereas smart contracts derive authority from decentralised blockchain networks.

These similarities emphasise the importance of interpretive flexibility for legal language that must expand its range to encompass advances in technology.

Traditionally, legal language aims for precision and objectivity but risks becoming self-referential (i.e. detached from societal and technological developments). In this rigid view, law could be referred to as 'a self-contained system of legal reasoning' [69] that isolates legal principles from broader contexts [cf. 61]. Nonetheless, meaning in law is not fixed but shaped by evolving conceptual frameworks, including digital environments. Thus, context is crucial for interpreting legal texts, social norms, and technological artifacts since they all revolve around relations. That is because a rigid approach can create an illusory sense of objectivity, overlooking the dynamic nature of legal reasoning.

In support of this adaptive framework, Buckland's notion of 'information-as-thing [8]' emphasises information's situational nature. The author argues that the relevance of information depends on the context, just as the significance of a document or fact varies with the inquiry and the inquirer's expertise. In turn, this perspective

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[8] As per the logic informing the proprietary paradigm; cf. [11].

does also resonate with the relational view of property, contract, and data, highlighting the need for contextual sensitiveness in legal interpretation. For the scope of this inquiry, this context-related view of information is not entirely new. Medieval legal scholars already recognized the importance of context in legal reasoning. They operated within the framework of Roman law but creatively adapted it to contemporary needs. Their interpretive approach balanced 'creation' (*Rechtsschöpfung*) and 'discovery' (*Rechtsfindung*), innovatively applying established principles while claiming continuity with authoritative sources [62]. This dual process allowed them to craft solutions that were flexible and yet legitimate [28].

From a hermeneutic standpoint, this legal innovation can also be understood in terms of what Ricœur describes as 'semantic pertinence' consisting of a meaning-making process in which novel interpretations emerge despite an apparent incongruity with conventional linguistic usage [14]. To continue, 'a metaphor is an instantaneous creation, a semantic innovation which has no status in already established language and which only exists because of the attribution of an unusual or an unexpected predicate. Metaphor therefore is more like the resolution of an enigma than a simple association based on resemblance; it is constituted by the resolution of a semantic dissonance' [50].

From another angle, this interpretive openness recalls Heidegger's account of *Auslegung* [31] (interpretation) as the process through which understanding makes the world intelligible (e.g. when it comes to current challenges posed by blockchain technology) by articulating what is already pre-understood in lived experience (e.g. established legal principles and their diachronic application within legal experiences). In this sense, *Auslegung* does not simply apply meaning to neutral facts but operates within a *Vorstruktur* (pre-existing structure) consisting of a prior structure of projection. Through it, phenomena become understandable as such [31; SZ, Ch. 5, §32]. By these means, interpretation is not an external act applied to legal texts but a mode of disclosing meaning grounded in *Dasein*'s situatedness in the world. Hence, only *Dasein* (i.e. *here*; the being for whom being is an issue) can be said to have and therefore to disclose meaning for meaning is not an abstract quality but emerges through the interpretive engagement with the world.

As a consequence, it situates the act of legal interpretation not within a closed system of rules but within a dynamic process of sense-making that reflects the interpreter's *thrownness* and responsibility for choosing among possible modes of being [31; SZ, Ch. 5, §31]. When understood against this background, meaning is not extracted from legal texts but constituted in the interplay between the juridical framework and the lived contexts it seeks to govern in a process of continuous mediation. Thus, the interpretive act does not seek to escape the hermeneutic circle. Rather, it must learn to enter it in the right way, recognising it as a productive condition of understanding rather than a logical flaw [31; SZ, Ch. 5, §33]. This orientation opens a path toward a legal hermeneutics that acknowledges the historicity and situatedness of legal meaning, allowing metaphors to operate not merely as stylistic devices but as structuring elements of legal thought attuned to contemporary modes of being (e.g. advances in technology).55

In support of these claims, the above can also finds further coherence when situated within Ricœur's theory of narrative and *emplotment*. Seen through his triadic

model of *mimesis*,[9] the legal challenges posed by blockchain invite not rejection but narratological realignment. The framing of legal meaning—far from being displaced—finds in blockchain an adjacent narrative mode. In this view, law and blockchain are not rivalrous but contiguous forms of *emplotment* as structurally distinct, yet methodologically aligned. Ricœur's concept of *mimesis II* (the act of emplotment[10])—thus becomes a methodological bridge, enabling the transposition of traditional legal categories onto the shifting terrain of distributed digital assets. Through this lens, tokens as 'digital representations of value' become amenable to legal reasoning by narrative structuration lending them normative relevance. Because *mimesis II* mediates between the doctrinal *prefigurations* inherent to *mimesis I* and the interpretive uptake of *mimesis III*, it embeds legal novelty within a temporality that remains aligned with established legal categories and evolving issues.

In following this line of reasoning, this creates an avenue for contemporary legal theorists to reinterpret traditional legal principles within decentralised digital frameworks, mirroring the way Medieval jurists reconciled ancient texts with new realities in a postmodern legal framework.

To continue, this suggested historical analogy hints at the possibility for metaphors of bridging the gap between traditional legal concepts and emerging digital realities. Legal language is traditionally expected to be precise and bereft of figurative expressions to limit forms of ambiguity. Yet, this rigidity risks making legal discourse self-referential and disconnected from contemporary technological contexts. In contrast, metaphors can expand interpretive possibilities, enabling a more adaptive legal language. More precisely, they can enable legal norms to evolve with changing contexts, preserving continuity and supporting innovation.

Through metaphors, legal interpretation can avoid self-referential pitfalls, which occur when law is seen as a closed logical system detached from social realities. Concretely, metaphors enable flexible interpretations that remain sensitive to context, ensuring legal principles' relevance in digital transformation. Additionally, this approach shows how legal norms can adapt to emerging digital realities, contributing to critical data studies by offering a nuanced understanding of legal and technological interactions.

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[9] In that regard, Ricœur elaborates a tripartite model of narrative each marking a distinct phase in narrative construction:

▶ *Mimesis I – Prefiguration.*

The pre-understanding of the world of action: cultural, linguistic, normative presuppositions that render narrative intelligible. In legal contexts, this encompasses foundational doctrines (e.g., contract, property, tort) and institutional norms that condition legal reasoning.

▶ *Mimesis II – Configuration.*

The act of emplotment (*mise en intrigue*): arranging events into a coherent narrative arc. In legal settings, this pertains to how facts, causes, and intentions are organized into legal arguments, judicial opinions, or even sequences of blockchain transactions.

▶ *Mimesis III – Refiguration.*

The reception and appropriation of the narrative: how interpreters—readers, judges, actors—reframe their understanding of both text and world. In jurisprudence, this refers to how legal decisions reshape interpretive frameworks and normative expectations [5].

[10] *mise en intrigue.*

In conclusion, metaphors can be crucial in linking traditional legal systems with emerging digital technologies. By drawing on historical parallels and recognizing the relational nature of information, property, and contract, this approach might foster legal semiotics-based studies by offering a more nuanced understanding of how legal norms can evolve alongside digital transformations [cf.].

At the heart of this metaphor-based approach, the ensuing paragraph provides a revised notion of Broekman's *conversion* [7] highlighting the transformative role of metaphors in legal interpretation.

5 The Role of *Conversion* in Shaping Legal Metaphors and Legal Interpretation

Law, at least in principle, operates through formalism. In turn, it can be framed as a theory of adjudication [20] that extends beyond legal texts, incorporating broader informational dimensions and therefore extending to society as a whole. In this respect, metaphors play a foundational role in legal reasoning, transcending their rhetorical and ornamental functions. Rather, they serve as cognitive tools that structure and shape legal interpretation, enabling abstract legal concepts to be articulated and applied. By acting as a bridge between mental constructs and their linguistic expressions, metaphors facilitate comprehension of legal principles and their practical applications, grounding complex ideas in more accessible language while preserving their nuanced meanings [57].

This raises the question of whether incorporating a strictly linguistic dimension could enhance our understanding of these issues. To this end, the term 'metaphor' originates from the Greek *metaphora* (μεταφορά), derived from *metaphero* (μετα + φέρω), meaning 'to transfer'. For present purposes it can be referred to as a movement from one regime of signs to another [43]. Therefore, metaphors function as rhetorical and conceptual devices that, by drawing implicit comparisons between seemingly unrelated concepts, enrich meaning by revealing hidden similarities. As Aristotle noted in *Poetics* [3], metaphors create vivid imagery and stimulate creative thought by substituting a tangible idea for an abstract one, inviting deeper engagement. As noted before, this relational component is central to property and contract law, where metaphors expose underlying equivalences by *unconcealing* the equivalence among its terms of comparison [48]. In this way, metaphors serve as conceptual bridges linking established legal principles to emerging domains, including data and crypto assets.

In following this line of reasoning, it could be fruitful to recall Heidegger's analysis of *Zeug* (tool, equipment) in *Sein und Zeit*, where he notes that the Greeks referred to 'things' as πράγματα consisting of entities encountered within the sphere of practical concern (πρᾶξις) [31]. Yet, as Heidegger observes, the Greeks obscured the ontological specificity of such entities by subsuming them under the more general category of mere objects. In contrast, Heidegger reclaims their pragmatic essence by introducing the notion of *Zeug*, entities encountered as usable within a totality of interrelated functions. For instance, a tool is never simply present-at-hand; it is always situated within a *Zeugganzheit*, a referential

whole that endows it with meaning through its *Um-zu* structure (i.e. its being 'in order to' serve some further function). Within this referential totality, utility, suitability, and readiness-to-hand are not merely attributes. Rather, they reveal themselves as constitutive modalities of being. As a consequence, this model of pragmatic reference echoes the structure of metaphor itself. More properly, each term within a metaphor points beyond itself, drawing significance from a wider semantic or functional constellation. Just as *Zeug* discloses its being through its embeddedness in a relational network, so too does metaphor reveal meaning through its positioning within overlapping interpretive fields. When resorting to the legal discourse, this suggests that the intelligibility of legal concepts (particularly those emerging in technologically mediated domains) rests not in their isolated definition, but in the network of functional roles and interpretive valences they inhabit.

Beyond linguistic devices, metaphors encapsulate broader conceptual frameworks. They serve as tools for adapting traditional legal principles to novel contexts, including the regulation of blockchain technology and crypto assets. Unlike mere rhetorical flourishes, these conceptual models require a sophisticated understanding of the underlying legal structures, enabling analogical reasoning and innovative legal interpretations.

As Black argues:

'Every metaphor is the tip of a submerged model. […] Metaphor and model-making reveal new relationships; both are attempts to pour new content into old bottles. But a metaphor operates largely with commonplace implications. You need only proverbial knowledge, as it were, to have your metaphor understood; but the maker of a scientific model must have prior control of a well-knit scientific theory if he is to do more than hang an attractive picture on an algebraic formula. Systematic complexity of the source of the model and capacity for analogical development are of the essence [4]'.

Against this backdrop, existing legal institutions appear rigid and inert before rapid social, economic, and political transformations. The core problem does not lie within the broader socio-political environment but rather in the stillness of legal frameworks struggling to accommodate the fluidity of digital systems. This tension is particularly evident in the rise of blockchain technology, governed by *lex cryptographica* consisting of a rule system encoded in autonomous protocols rather than established through traditional legal mechanisms [67]. As a matter of fact, this is the core of blockchain's promise of decentralisation aiming at eliminating reliance on governmental and corporate intermediaries. Yet, this decentralization risks replacing traditional legal oversight with the unchecked authority of self-executing code.

In particular, the friction between existing legal structures and blockchain's code-based governance emerges when trying to determine the legal *situs* of crypto assets under Private International Law principles. The challenge stems from the fact that

blockchain technology is decentralised and lacks a fixed physical location, making it difficult to assign a jurisdiction.[11]

Precisely, a token recorded on a decentralised ledger exists simultaneously across all nodes in the network, making it impossible to tie it to a specific geographic location.

Unlike traditional assets, which are often governed by the jurisdiction where they are physically located, blockchain tokens operate without a central server or authoritative node.

Hence, this inherent characteristic underscores the difficulty of applying conventional legal principles, which rely on geographical anchoring, to digital assets.[12]

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[11] As Guillaume puts it: 'The blockchain calls the traditional approach of private international law into question, since in reality it is impossible to establish the geographical location of blockchain transactions'. Then, the author indicates similar references on the matter [29].

[12] Despite current shortcomings, Private International Law doctrine proposed that the location of nodes within a network could be used as a connecting factor to determine the *lex rei sitae*. However, this approach has been rejected because it would fragment legal applications across the network, undermining property rights' consistency [9].

This issue highlights the necessity of distinguishing between property law, governed by specific rules, and obligations law, which operates under different principles [63]. This distinction is highlighted in the *Giuliano-Lagarde Report*, which excludes property matters from the scope of the Rome I and II Regulations [26].

To continue, efforts to classify crypto assets within existing legal frameworks have yielded mixed results. For instance, treating them as tangible assets, as Germany has done, does not resolve the localisation issue under the *lex rei sitae* principle [25]. Although security tokens align with rules for traditional securities, many crypto assets (e.g. Bitcoin) lack comparable real-world equivalents, necessitating bespoke legal approaches.

Against this backdrop, regulatory classification becomes a key issue especially when crypto assets fall within the scope of financial instruments. As follows from Recital 30 of the Rome I Regulation, in conjunction with Article 94(2) of MiFID II, the term 'financial instrument' is defined in accordance with Article 4(1)(15) of MiFID II. Together with Annex I, Section C of MiFID II, this provision establishes an exhaustive list of financial instruments, categorizing them under a broad yet structured framework. The concept of a financial instrument thus encompasses a wide range of assets, offering a regulatory benchmark for classification.

While crypto assets were understandably excluded from MiFID II's original scope due to their nonexistence at the time, this historical omission can no longer justify a rigid interpretation. As these assets now perform economically analogous functions to regulated financial instruments, their regulatory classification demands a reinterpretation of existing provisions in light of evolving market realities.

The evolving nature of financial markets and the increasing integration of crypto assets into investment and trading practices challenge rigid interpretations. As regulatory frameworks adapt, the question arises as to how these assets should be classified and whether they fall within the existing scope of financial regulation.

While the contractual aspects of crypto transactions are increasingly addressed by instruments like the Rome I Regulation or the 2015 Hague Principles, proprietary aspects remain largely unregulated and uncertain.

In this respect, the law governing proprietary rights in digital assets remains contentious due to their unique existence on distributed ledgers. Attempts to analogize crypto assets with intermediated securities shall be made cautiously, as the concept of intermediaries is far less clear in the context of crypto assets [15] often representing ownership rights in digital form. In turn, these rights may relate to physical assets (exogenous) or native digital assets (endogenous).

Differently put, tokens serve a dual role, acting both as standalone assets and as representations of underlying rights [45].

In brief, establishing applicable law and jurisdiction over crypto assets is further complicated by the

To continue, blockchain's immutability presents further legal challenges. For instance, when smart contracts fail due to coding errors or exploitation, assigning liability can be complex, potentially involving developers, users, or the broader network. In summary, existing legal frameworks, designed for stability and predictability, struggle to address these issues and keep pace with rapid digital innovation. This gap between traditional legal principles and blockchain's evolving nature creates uncertainty, forcing businesses, governments, and individuals to navigate a fragmented system where algorithmic decision-making increasingly influences the rule of law.

As a result, the decentralised nature of blockchain assets means they are not controlled by any single jurisdiction, rendering the traditional rationale for *situs*-based legal principles[13] largely irrelevant.[14]

However, resorting to the notion of blockchain alone is insufficient to create a comprehensive classification framework for these assets, as their legal treatment often depends on their specific characteristics and use cases. In short, the decentralised and immutable nature of blockchain technology, coupled with the lack of clear liability frameworks for smart contracts, creates multifaceted legal conundrums.

Against this backdrop, metaphors can provide a conceptual tool for integrating legal frameworks with technological advancements. To this end, Broekman's notion of *conversion* is particularly relevant, especially when tokens—and by extension, blockchain networks—are understood as digital representations of value or rights.[15] Methodologically, this concept may relate metaphors' functioning to the representational facet of blockchain networks, and the relational realm of property and contracts as well.

Footnote 12 (continued)

seemingly de-spatialized nature of blockchain technology, where activities appear to occur everywhere and nowhere simultaneously [39].

Similarly, this also affects characterization, which involves determining whether a legal question fits within the scope of specific legal rules [21].

Unlike general legal subsumption, which typically involves assigning facts to pre-existing legal categories within a domestic system, characterisation in Private International Law serves a gatekeeping function. Concretely, it determines how a legal issue should be framed to identify the relevant conflict-of-laws rule. In the context of crypto assets, this function becomes more complex due to the fluid and multi-functional nature of tokens, which may defy neat classification into conventional categories such as property, obligation, or security.

frameworks.

For crypto assets, this means characterization must be case-specific, requiring a thorough examination of all relevant circumstances to determine their legal treatment.

On this basis, the abstract, decentralized nature of crypto assets poses challenges to traditional notions of territorial sovereignty. Interestingly, the issue is not the absence of links to nation-states but the abundance of equally valid links to multiple jurisdictions.

[13] Where the country of location holds authority over the asset.

[14] As noted in §1, Further complicating matters is the distinction between 'crypto assets' and 'digital assets'. While digital assets encompass all forms of digitally stored value or rights, crypto assets are specifically tied to blockchain technology.

[15] Cf. [42] reading 'digital representation of value or rights which may be transferred and stored electronically, using distributed ledger technology or similar technology'.

More precisely, Broekman describes *conversion* as the interaction between analog and digital meaning, emphasizing the role of transition:

'A word is defined in computer architecture as the natural unit of data used by a particular processor design. Note that the number of bits in a word (its size, width, length, etc.) characterizes this basic element of spoken, written, or conceived language. This characterization leads, surprisingly enough, to a new plural feature of language. Any word embodies analog meaning (the seme) together with basic features of digital character (the digit). Their continuous transition characterizes today's mind. This concept is named conversion and forms the foundation for the actual power of digitalization of the human mind, its observation, its cognition, and inter-subjectivity' [7].

Visually, the above can be rendered in accordance with differential calculus functioning to grasp the definition of meaning consisting of what 'is actually related to a sign by a chosen relation' [46]. That is because 'what matters at the level of truths of existence is not the identity of the predicate and the subject but rather that one passes from one predicate to another, from the second to a third, from the third to a fourth, and so on' [60].

In line with this reasoning, this framework mirrors the sequence of tokens in blockchain networks, where each token transitions to the next in a continuous, relational flow, reinforcing the concept of a dynamic progression rather than fixed identities [cf. 6].
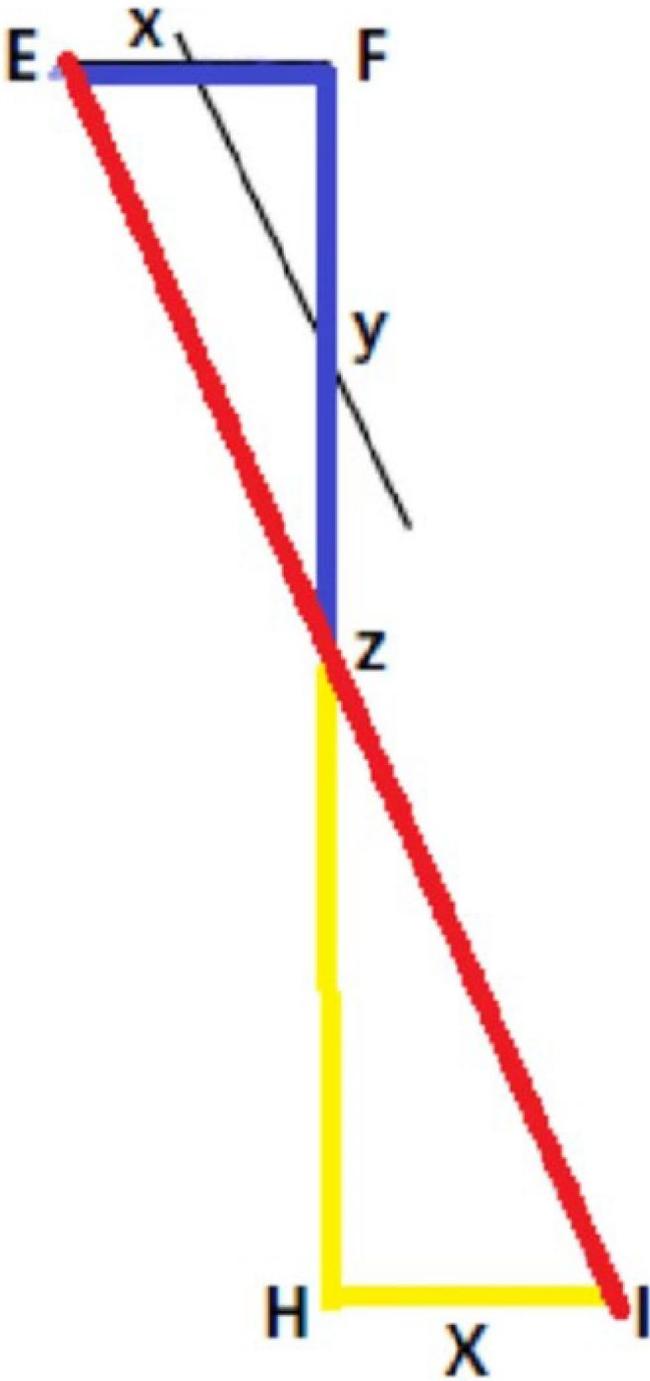
Where:

EF and FZ segments represent the law (analog).

HI and IZ segments represent bytes, tokens, and algorithms (digital).

EI segment corresponds to *conversion*.

In turn,

Z point epitomises *conversion*'s 'entering a/the stream of thought formations' [7].

In this connection, point Z can properly establish a rule of recognition [31] capturing the transfer of legal categories into the token' lifeworld.

At its core, *conversion* seizes the epistemological shift whereby legal meaning emerges not through the static application of predefined categories, but through a continuous interplay between (legal) semantic content and digital form. It reflects the transformation of law's semiotic structure in the face of digitalisation, wherein elements traditionally anchored in tangible contexts—such as possession or transfer—are reconstituted through abstract technical operations. Within this view, tokens are not merely digital proxies of pre-existing rights, but constitutive of novel legal phenomena whose intelligibility demands a departure from binary logics of analogue versus digital, or res versus symbol. Conversion thus becomes relevant not only as a methodological insight, but as a necessary condition for rethinking legal cognition in environments shaped by distributed architectures and programmable transactions. It allows one to recognise that token-based systems do not merely replicate traditional forms of ownership but instead articulate emergent juridical forms, calling for legal reasoning capable of operating within this altered linguistic and technological register.

From another angle, the above can be approached in accordance with differential calculus functioning to grasp the definition of meaning consisting of what 'is actually related to a sign by a chosen relation' [46]. This understanding aligns with a legal-interpretation-based approach, where interpretation is inherently an act of adjudication [20].

As noted above, that is because 'what matters at the level of truths of existence is not the identity of the predicate and the subject but rather that one passes from one predicate to another, from the second to a third, from the third to a fourth, and so on' [60].

In line with this reasoning, this framework mirrors the sequence of tokens in blockchain networks, where each token transitions to the next in a continuous, relational flow, reinforcing the concept of a dynamic progression rather than fixed identities.

Against this backdrop, *conversion* can be referred to as 'entering a/the stream of thought formations [7]. Therefore, it can properly establish a rule of recognition capturing the transfer of legal categories into the tokens' lifeworld.

This perspective emphasises that the process of *conversion* involves a dual-layered transformation, wherein legal language must continuously shift between traditional analog structures and digital constructs. Thus, the concept of *conversion* provides a critical framework for understanding the evolving nature of legal interpretation in digital domains. From a semiotic perspective, this reasoning applies to legal interpretation, particularly in translating legal principles into frameworks for immaterial assets like NFTs. Legal interpretation relies on community-based

meaning-making, resonating with Hart's *internal point of view*, which underscores the role of legal practitioners in defining rules of recognition.

Accordingly, legal interpretation can ensure continuity between evolving technological paradigms and established legal norms.

As Dickson aptly states:

> The key to this issue lies in interpretation's dualistic nature, i.e. that it has both a backward–looking conserving aspect and a forward looking creative one. This dualism would seem to indicate that in interpreting the law, judges both seek to capture and be faithful to the content of the law as it currently exists, and to supplement, modify, or bring out something new in the law, in the course of reasoning from the content of the law to a decision in a particular case [16].

Further, it is worth mentioning that the [legal] 'community is the anchor of interpretation. Interpretation is only possible because of community. Since adjudication is interpretation, adjudication rests on community. Without an interpretive community, subjectivity and objectivity would split apart into an irreconcilable dichotomy' [20, 40]. In this connection, legal metaphors would facilitate the circumvention of the constraints inherent in smart contracts, for legal interpretation can be conceived as 'ascription of meaning' [24].

Thus, metaphors do more than illuminate legal concepts; they provide a necessary mechanism for integrating legal frameworks with technological advancements, ensuring that legal interpretation remains dynamic, relevant, and responsive to contemporary challenges. However, this process can be truly effective through the above-outlined method based on Medieval legal interpretation and *conversion* acknowledging the importance of context in legal reasoning.

Ultimately, the adaptation of legal reasoning through metaphorical and linguistic frameworks provides a structured approach to mitigating the challenges posed by a solely algorithmic-based governance, ensuring that legal systems remain not only relevant but also resilient in the face of rapid advances in technology.

6 Concluding Remarks

In light of the above results, this paper has argued that metaphor can offer a generative pathway to reframe the epistemological gap between established legal categories and advances in technology. Rather than treating blockchain technologies as legally unintelligible ontologies, the study has explored how tokenisation, smart contracts, and blockchain networks may be brought into the orbit of legal reasoning through a metaphoric-based logic sustaining both continuity and coherence with the past and transformation. This inquiry has touched on the limits of traditional property concepts when assessed against the lack of a clear spatial arrangement for crypto assets disrupting Private International Law's *lex situs* paradigm. Across these domains, metaphor cannot only function as a mere rhetorical ornament. Rather, it can be referred to as an instrument of conceptual displacement and legal innovation.

This shift reflects a deeper semiotic transformation wherein legal meaning no longer emerges solely through a conservative application of established legal categories but through a dynamic interplay between technical constructs and evolving normative frameworks. In that regard, a revisited notion of *conversion* can set the juridical recognition of digitally encoded relations not as mere digital analogues of pre-existing entitlements. Rather, they can be referred to as foundational elements of novel legal forms irreducible to the dichotomy of analogue/digital. In turn, this methodological approach can inform the described functioning of legal metaphors. In doing so, tokens require a mode of legal reasoning that recognises their embeddedness in a stream of signifying operations, rather than their reduction to inert categories. Instead of forms, the actual object of *conversion* can be found in the semiotic infrastructure through which recognition, transfer, and possession acquire legal meaning. Working as a *differential* passage between predicates, the *calculus* of such meaning can thus frame tokenisation as juridical transition, instead of a mere replication.[16]

As well, this interpretive modality can be approached via Heidegger's concept of *Auslegung*. It consists of the unfolding of meaning from what is already pre-understood in our practical engagement with the world. In this connection, legal interpretation turns out to be an act of ontological disclosure. Concretely, it renders intelligible the networked world of tokenised transactions by drawing upon a prior horizon of legal meaning. In this context, legal metaphors become the hinge through which the *prefigured* world of legal categories is rendered responsive to the emergent lifeworlds of distributed value and digital exchange.

Accordingly, Ricœur's triadic structure of narrative *emplotment* might lend support to these considerations. Central to *mimesis II* is the temporal organisation of meaning. It offers a methodological bridge between doctrinal prefiguration (*mimesis I*) and the interpretive uptake of decentralised legal forms (*mimesis III*).

Against this background, blockchain does not stand apart from law but develops as a contiguous narrative. Through legal metaphors, it can enable the *refiguration* of juridical categories after re-*emplotting* its narrative logic. Within this narratological arc, tokens acquire juridical relevance not as mere digital representations of value but as narrative nodes whose sequencing *configures* new avenues for normativity.

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[16] With regards to NFTs, Serfaty states that 'a new incorporeal movable good, the NFT can have as its underlying asset a work of art whose support is material, which implies examining the relationships between the NFT (incorporeal movable), the support (corporeal movable), and the work (intellectual good). The ownership of the first does not, in itself, entail ownership of the second, nor of the third: these three properties are independent and must endeavour to coexist' [56]. In recognising NFTs as true property, Serfaty emancipates them from their underlying references. Unlike certificates of ownership or evidentiary titles (*instrumentum*), which remain dependent accessories or proofs of another right, NFTs stand alone as autonomous goods. Hence, the outlined reasonings lend support to a powerful argument for recognising NFTs as true movable assets, not merely as legal instruments or titles. In this view, the NFT is not reducible to the asset it references. Rather, it is itself the object of ownership.

References

1. Ali, Robleh, et al. 2014. Innovations in payment technologies and the emergence of digital currencies. *Bank of England Quarterly Bulletin* 54:262–275.
2. Allen, Jason G., et al. 2020. *Legal and Regulatory Considerations for Digital Assets*, 13. University of Cambridge. https://www.jbs.cam.ac.uk/wp-content/uploads/2020/10/2020-ccaf-legal-regulatory-considerations-report.pdf
3. Aristotle. *Poetics* (§21).
4. Black, Max. 1960. Models and archetypes. In *Both Human and Humane: The Humanities and Social Sciences in Graduate Education*, ed. Charles E. Boewe and Roy F. Nichols, 39–65. Philadelphia: University of Pennsylvania Press. https://doi.org/10.9783/9781512814569-003.
5. Blandino, Pierangelo. 2025. Ricœur's intersection and the harmonisation of law and algorithms. *International Journal for the Semiotics of Law*. https://doi.org/10.1007/s11196-025-10325-5.
6. Blandino, Pierangelo. 2025. Semiotokens, algorithms, and blockchain networks: New possible patterns in legal thought. *International Journal for the Semiotics of Law* 38:327–362. https://doi.org/10.1007/s11196-024-10178-4.
7. Broekman, Jan M.. 2023. *Knowledge in change: The semiotics of cognition and conversion*. Berlin: Springer.
8. Buckland, Michael K. 1991. Information as thing. *Journal of the American Society for Information Science* 42 (5): 351–360.
9. Carr, Daniel. 2019. Cryptocurrencies as property in civilian and mixed legal systems. In *Cryptocurrencies in Public and Private Law, 180 f, § 7.07*, ed. David Fox and Sarah Green. OUP.
10. Casino, Francesco, Thomas K.. Dasaklis, and Constantinos Patsakis. 2019. A systematic literature review of blockchain-based applications: Current status, classification and open issues. *Telematics and Informatics* 36 (2019): 55–81.
11. *Code Civil*, Art. 544.
12. *Code monétaire et financier*, Art. L.552-2.
13. De Caria, Riccardo. 2017. A digital revolution in international trade? The international legal framework for blockchain technologies, virtual currencies, and smart contracts: Challenges and opportunities. In *UNCITRAL, Modernizing International Trade Law to Support Innovation and Sustainable Development*, 106. UNCITRAL, November. https://aperto.unito.it/retrieve/handle/2318/1632525/464608/R.%20de%20Caria%2c%20A%20Digital%20Revolution%20%282017%29.pdf
14. de Leeuw, Marc. 2021. *Paul Ricœur's Renewal of Philosophical Anthropology: Vulnerability, Capability, Justice*. Lanham: Lexington Books.
15. De Vauplane, Hubert. 2018. Blockchain and intermediated securities. In *NIPR*.
16. Dickson, Julie. 2008. *Interpretation and Coherence in Legal Reasoning*. Stanford: Stanford University Press.
17. Dimitropoulos, Georgios. 2020. The law of blockchain. *Washington Law Review* 95:1117.
18. Directive (EU) 2015/849 of the European Parliament and of the Council of 20 May 2015 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing.
19. Dutton, William H. 2012. The fifth estate: A new governance challenge. In *The Oxford Handbook of Governance*, ed. David Levi-Faur. OUP. https://doi.org/10.1093/oxfordhb/9780199560530.013.0041.

20. Fiss, Owen. 1982. Objectivity and interpretation. *Stanford Law Review* 34:739–763.
21. Forsyth, Christopher. 1998. Characterisation revisited: An essay in the theory and practice of the English conflict of laws. *Law Quarterly Review*. 114:141–161.
22. Gadamer, H.G. 1960. Wahrheit und methode Grundzüge einer philosophischen Hermeneutik. *Tübingen*. 305–312 (2004): 299–306.
23. Garcia-Teruel, Rosa M.., and Héctor. Simón-Moreno. 2021. The digital tokenization of property rights: A comparative perspective. *Computer Law & Security Review* 41:1–2.
24. Geoffrey, Samuel. 2003. *Epistemology and Method in Law*. London: Taylor & Francis.
25. *Gesetz zur Einführung von elektronischen Wertpapieren* vom 3. Juni 2021 (BGBL. I S. 1423), art. 1 §2(3).
26. Giuliano, Mario, and Paul Lagarde. 1980. Report on the convention on the law applicable to contractual obligations. *OJ C* 282 (1): 10.
27. Goldenfein, Jake, and Andrea Leiter. 2018. Legal engineering on the blockchain: 'Smart contracts' as legal conduct. *Law and Critique* 29 (2): 141–149.
28. Grossi, Paolo. 2010. *A History of European Law* (trans. Hooper, Laurence). Chichester: Wiley-Blackwell.
29. Guillaume, Florence. 2019. Aspects of private international law related to blockchain transactions. *Elgar Online*.
30. Hari, Olivier, and Ulysse Pasquier. 2018. Blockchain and distributed ledger technology (DLT): Academic overview of the technical and legal framework and challenges for lawyers. *International Business Law Journal* 5:423–447.
31. Heidegger, Martin. 1927. *Sein und Zeit*. Tübingen: Max Niemeyer Verlag. Ch. 5, §31 *Das Da-Sein als Verstehen*. Ch. 5, §32 *Verstehen und Auslegung*. Ch. 5, §33 *Die Aussage als abkünftiger Modus der Auslegung*.
32. Houben, Robby, and Alexander Snyers. 2018. *Cryptocurrencies and Blockchain: Legal Context and Implications for Financial Crime, Money Laundering, and Tax Evasion*. European Parliament, July, 31 ff. https://www.europarl.europa.eu/cmsdata/150761/TAX%3%20Study%20on%20cryptocurrencies%20and%20blockchain.pdf
33. Jenks, Edward. 1947. *English Civil Law Digest of English Civil Law*. London: Butterworth.
34. Jehl, Laura E., and Brian Bartish. 2018. Blockchain 'smart contracts'—A new transactional framework. *Bloomberg Law*. https://www.bloomberglaw.com/external/document/X4SGO17O000000/tech-telecom-professional-perspective-blockchain-smart-contracts.
35. Jewell, Dan and Roe, Katherine. 2021. *Non-fungible Tokens: What are the Legal Risks?* DLA Piper Report. Available online at: https://www.dlapiper.com/en/insights/publications/2021/09/non-fungible-tokens-what-are-the-legal-risks
36. Johnstone, Barbara. 1996. The linguistic individual: self-expression in language and linguistics. Incorporated: Oxford University Press.
37. Kolber, Adam J. 2018. Punishment and moral risk. *University of Illinois Law Review* 2018 (2): 487–546.
38. Law Commission of England and Wales. 2021. *Digital Assets: Call for Evidence*. Law Commission, para. 1.20. https://s3-eu-west-2.amazonaws.com/lawcom-prod-storage-11jsxou24uy7q/uploads/2021/04/Call-for-evidence.pdf
39. Lehmann, Matthias. 2022. Extraterritoriality in financial law. In *The Cambridge Handbook on Extraterritoriality*, ed. Austin Parrish and Cedric Ryngaert. Cambridge: CUP.
40. Lloyd, Harold Anthony. 2021. How to do things with signs: Semiotics in legal theory, practice, and education. *University of Richmond Law Review* 55:861–920. https://doi.org/10.2139/ssrn.3516238.
41. Mason, Malcolm. 1938. A theory of contract sanctions. *Columbia Law Review* 38(5): 775–808.
42. MiCA, Art. 3 §1.
43. Moore, N. 2007. Icons of control: Deleuze, signs, law. *International Journal for the Semiotics of Law* 20:33–41.
44. Noori, Negar, Martin de Jong, Marijn Janssen, Dann Schraven, and Thomas Hoppe. 2021. Input–output modeling for smart city development. *Journal of Urban Technology* 28 (1–2): 71–92. https://doi.org/10.1080/10630732.2020.1794728.
45. OECD. 2021. *Regulatory Approaches to the Tokenisation of Assets*. OECD, January 26, 10. www.oecd.org/finance/Regulatory-Approaches-to-the-Tokenisation-of-Assets.htm
46. Ogden, C. K., and I. A. Richards. 1923. *The Meaning of Meaning: A Study of the Influence of Language Upon Thought and of the Science of Symbolism*. New York: Harcourt, Brace & World.

47. Philippopoulos-Mihalopoulos, Andreas. 2016. Flesh of the law: Material legal metaphors. *Journal of Law and Society* 48:45–65. https://doi.org/10.1111/j.1467-6478.2016.00740.x.

48. Plato. *Republic* (514A–517A).

49. Rantala, Juho. 2019. Blockchain as a medium for transindividual collective. *Culture, Theory and Critique* 60 (3–4): 250–263. https://doi.org/10.1080/14735784.2019.1694213.

50. Ricœur, Paul. 1976. *Interpretation Theory: Discourse and the Surplus of Meaning*. Fort Worth: Texas Christian University Press.

51. Ricœur, Paul. 1977. *The rule of metaphor* (trans: Czerny, Robert). Toronto: University of Toronto Press.

52. Riles, Annelise. 2008. The anti-network: Private global governance, legal knowledge, and the legitimacy of the state. *American Journal of Comparative Law* 56 (3): 605–630. https://doi.org/10.5131/ajcl.2007.0018.

53. Satoshi Nakamoto. 2009. *Bitcoin: A Peer-to-Peer Electronic Cash System*. Bitcoin, May 24. https://bitcoin.org/bitcoin.pdf

54. Schwab, Klaus. 2017. *The Fourth Industrial Revolution*. New York: Crown Business.

55. Seckelmann, Margrit. 2013. Clotted history and chemical reactions—On the possibility of constitutional transfer. In *Order from Transfer. Comparative Constitutional Design and Legal Culture*, ed. Günter, 39–42. Frankenberg: Edward Elgar.

56. Serfaty, Vidail. 2023. Réflexions sur la nature juridique du NFT et son rapport à l'œuvre de l'esprit. *Dalloz IP/IT* 2023:77.

57. Seškauskienė, Inesa, ed. 2022. *Metaphor in Legal Discourse*. Cambridge: Cambridge Scholars Publishing.

58. Simondon, Gilbert. 2005. *L'invention dans les Techniques. Cours et Conférences*. Paris: Éditions du Seuil.

59. Singer, Joseph William. 2005. *Introduction to Property*, 2nd ed. New York: Law & Business.

60. Smith, Daniel W. 2005. Deleuze on Leibniz: Difference, continuity, and the calculus. In *Current Continental Theory and Modern Philosophy*, ed. Stephen H. Daniel, 127–147. Evanston: Northwestern University Press.

61. Solan, Lawrence M., and Peter M. Tiersma. 2005. *Speaking of Crime: The Language of Criminal Justice*. Chicago: University of Chicago Press.

62. Spinosa. 2022. História do Direito. *RHD (Curitiba)* 3 (5): 40–52.

63. Torremans, Paul, et al. (eds.). 2017. *Cheshire, North & Fawcett: Private International Law*, 15th ed., 41. OUP.

64. Werbach, Kevin. 2019. *The Blockchain and the New Architecture of Trust*. Cambridge: MIT Press.

65. Wiener, Norbert. 1961. *Cybernetics: Or Control and Communication in the Animal and the Machine*, 2nd ed. Cambridge: MIT Press.

66. World Bank Group, Harish Natarajan, Solvej Krause, and Harish Gradstein. 2017. *Distributed Ledger Technology (DLT) and Blockchain (FinTech note no. 1)*. Washington, IV: World Bank.

67. Wright, Aaron, and Primavera de Filippi. 2015. *Blockchain and the Law: The Rule of Code*. Harvard University Press.

68. Wright, Aaron, and Primavera de Filippi. 2017. *Decentralized Blockchain Technology and the Rise of Lex Cryptographia*. SSRN, July 25. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2580664

69. Zaremby, Justin. 2014. *Legal Realism and American Law*. London: Bloomsbury.

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