
Non-Fungible Tokens (NFT): business models, legal aspects, and market valuation*

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An NFT is a unit of data stored on a digital ledger, called a blockchain, which can be sold and traded. The NFT can be associated with a particular digital or physical asset (such as a file or a physical object) and a license to use the asset for a specified purpose. An analysis of the business model and the legal aspects is propaedeutic to the market valuation. To the extent that NFTs can remove intermediaries, simplify and validate transactions, and create new markets, they can be used for several valuation purposes, according to the stakeholder involved (creator/artist; consumer, etc.).

Summary

1. Introduction. – 2. NFT: the framework. – 3. From tokens to non-fungible tokens. – 4. The market for the NFTs. – 5. The future of the NFTs. – 6. Legal aspects. – 7. Market valuation of the NFTs. – 8. The legal nature of a blockchain as a prerequisite for valuation.

Keywords

blockchain - digital art – cryptocurrencies – cryptography - decentralization

1. Introduction

A non-fungible token (NFT) is a unique and non-interchangeable unit of data stored on a digital ledger (blockchain)¹. NFTs can be associated with easily-reproducible items such as photos, videos, audio, and other types of digital files as unique items (analogous to a certificate of authenticity), and use blockchain technology to give the NFT a public proof of ownership. Copies of the original file are not restricted to the

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¹ See U.W. Chohan, *Non-Fungible Tokens: Blockchains, Scarcity, and Value*, Critical Blockchain Research Initiative (CBRI) Working Papers, 2021; K. De-Rong-L. Tse-Chun, *Alternative Investments in the Fintech Era: The Risk and Return of Non-fungible Token (NFT)*, in *ssrn.com*, 2021; A. Guadamuz, *The Treachery of Images: Non-fungible tokens and copyright? NFT*, in *Journal of Intellectual Property Law & Practice*, forthcoming, 2021, in *ssrn.com*; S. Hong-Y. Noh-C. Park, *Design of Extensible Non-Fungible Token Model in Hyperledger Fabric*, Proceedings of the 3rd Workshop on Scalable and Resilient Infrastructures for Distributed Ledgers (SERIAL '19). Association for Computing Machinery, New York, 2019, 1–2, in *ssrn.com*; Q. Wang -L. Rujia-W. Qi-C. Shiping, *Non-Fungible Token (NFT): Overview, Evaluation, Opportunities and Challenges*, Tech Report on NFT, 2021, in *arxiv.org*.

owner of the NFT and can be copied and shared like any file. Unlike cryptocurrencies, they cannot be traded or exchanged at equivalency. This differs from fungible tokens like cryptocurrencies, which are identical to each other and, therefore, can be used as a medium for commercial transactions.

The distinct construction of each NFT has the potential for several use cases. For example, they are an ideal vehicle to digitally represent physical assets like real estate and artwork. Because they are based on blockchains², NFTs can also be used to remove intermediaries and connect artists with audiences or for identity management. NFTs can remove intermediaries, simplify transactions, and create new markets³.

This study considers the definitions of NFTs and adjacent technologies (blockchains, etc.), as a prerequisite for the market evaluation. An analysis of the legal aspects completes the overview and precedes the financial and economic valuation, following the sequential pattern synthesized in figure 1.



Figure 1 – The NFT Value Chain: Definition, Market, Legal Aspects and Valuation

This study focuses on the market and legal aspects of the tokens as well as their valuation therefore it does not contain information about their technological aspects for which extensive literature can be found (Hong et al., 2019, cit.; Wang et al., 2021, cit.).

2. NFT: the framework

Much has already been written and heard about blockchains, tokens, and cryptocurrencies. Therefore, a summary will be presented here only to introduce the main topic. The blockchain is based on a computer network and from the point of view of functionality, it allows one to manage a database in a distributed way. From an operational point of view, it is an alternative to centralized archives and allows the updating of data with the collaboration of network participants and with the possibility of having shared, accessible, distributed data among all participants. It allows data management in terms of verification and authorization without the need for a central authority. The main features of blockchain technologies are the immutability of the register, transparency, traceability of transactions, and security based on cryptographic techniques.

² See K Cortnelius, *Betraying blockchain: Accountability, transparency and document standards for non-fungible tokens (NFTS)*, in *mendeley.com*, 2021

³ In *investopedia.com*.

A token is a blockchain-based digital asset that can be exchanged between two parties without the need for the action of an intermediary. What follows is a macro classification of tokens.

Cryptocurrencies: they belong to the token family known as “Class 1 Token“. Cryptocurrencies are tokens that have no counterparty and can be transferred via blockchain transactions. A cryptocurrency behaves like a currency even if it doesn’t exist in physical form (like paper money). Generally, it is not issued by a central authority even if several countries are studying a national cryptocurrency.

1. Non-backed Cryptocurrencies: these are cryptocurrencies whose value is not anchored to assets with official values such as fiat coins, gold, or other exchange-traded commodities. Bitcoin⁴, Bitcoin Cash, Litecoin, etc. belong to this category.
2. Backed Stablecoins: these are tokens of the cryptocurrencies family where the price is designed to be pegged to fiat money or exchange-traded commodities (such as precious metals or industrial metals). Apart from the lower volatility, unlike other cryptocurrencies, stablecoins have one of the properties of the currency: the value reserve. Examples of stablecoin are USD Tether, designed to maintain a value equal to the US dollar, and Paxos Gold backed by gold.
3. Non-Backed Stablecoins: these are stablecoins whose collateral is a cryptocurrency instead of a fiat or a raw material. In this case, the collateralization is done on-chain, that is on the blockchain. Instead of supporting the currency with some resources, an “algorithmic central bank“ is created that manages supply and demand based on rules encoded in a smart contract.

A smart contract is a computer program or a transaction protocol that is intended to automatically execute, control, or document legally relevant events and actions according to the terms of a contract or an agreement. The objectives of smart contracts are the reduction of need in trusted mediators, arbitrations and enforcement costs, fraud losses, as well as the reduction of malicious and accidental exceptions.

Tokens that incorporate rights to counterparties: these are tokens that can give the owners a right that can be exercised towards the person who generated the tokens or possibly towards third parties. This token family is also known as “Class 2 Token“. This family includes the Utility Tokens and the Security Tokens:

1. Utility Tokens: in this case, the holder of the token has the right to receive a specific service or good from the issuer or from a third party who has signed a commercial agreement. These are tokens representing assets that are not financial or equity instruments.
2. Security Tokens: these are tokens that incorporate the right to receive a specific payment or a future payment or tokens representing assets without conferring different rights, such as the right to vote, or economic rights for legal representatives or shareholders of a company, etc.

Tokens that incorporate property rights: these are tokens that can perform a mixed function. They are tokens that represent co-ownership rights or that represent property but also confer different rights, such as the right to vote, or economic rights

⁴ See A. Lennart, *The non-fungible token (NFT) market and its relationship with Bitcoin and Ethereum*, in *Blockchain Researching Lab Working Paper Series* No. 20, 2021.

for legal representatives or shareholders of a company, etc. This token family is also known as “Class 3 Token“. The additional rights are automatically managed by the Smart Contracts embedded in the token.

3. From tokens to Non-Fungible-Tokens (NFT)

The tokens of the previous families are fungible that is they are interchangeable. In other words, they matter to their value rather than to the object itself. For example, a typical fungible good is money. If a person must receive a sum of money of € 100, it does not matter whether it is paid with 5 banknotes of € 20 or 10 of € 10 or other combinations, nor does he have an interest in having the money loaned be returned with the same banknotes given in the loan. It only detects that the same amount of money lent returns. On the contrary, non-fungible goods have peculiarities that make them unique and therefore not replaceable with one another.

With the Ethereum⁵ blockchain gaining prominence in early 2017, memes (a content that quickly becomes viral) started to be traded there as well. In March of 2017, a project by the name of Peperium was announced to be a «decentralized meme marketplace and trading card⁶ game (TCG) that allowed anyone to create memes that live eternally on IPFS and Ethereum». Peperium had an associated token, with the ticker symbol of RARE, which was used for meme creation and paying listing fees.

As the trading of rare pipes on Ethereum picked up, two “creative technologists” decided to create their own NFT project with a slight twist. John Watkinson and Matt Hall realized they could create unique characters generated on the Ethereum blockchain. Characters would be limited to 10,000 and no two characters would be the same.

They called their project Cryptopunks, as a reference to the Cypherpunks who experimented with precursors to Bitcoin in the 1990s. Surprisingly, Watkinson and Hall opted to let anyone with an Ethereum wallet claim a Cryptopunk for free. All 10,000 Cryptopunks were swiftly claimed and started a thriving secondary marketplace where people bought and sold them⁷.

As of early April 2021, over 8,000 sales had been recorded in the previous 12 months, with an average sale price of 15.45 ether (\$30,412.40). The total value of all sales is 127,360 ether (\$251,620,000) and that value grows daily.

In October 2017 with CryptoKitties NFTs hit the mainstream. CryptoKitties is a blockchain-based virtual game that allows players to adopt, raise, and trade virtual cats. The rise of CryptoKitties coincided with the 2017 crypto bull market: some virtual cats were even selling for over \$100,000.

⁵ S.M. Werner-PJ Pritz-D. Perez, *Step on the Gas? A Better Approach for Recommending the Ethereum Gas Price*, in P. Pardalos, I. Kotsireas-Y. Guo-W. Knottenbelt (eds.), *Mathematical Research for Blockchain Economy*, Springer Proceedings in Business and Economics, Cham, 2020

⁶ I.F. Kanellopoulos-D. Gutt-T. Li, *Do Non-Fungible Tokens (NFTs) Affect Prices of Physical Products? Evidence from Trading Card Collectibles*, Rotterdam School of Management, Erasmus University, 2021, in *ssrn.com*.

⁷ In *opensea.io/collection/cryptopunks*.

This opened many people's eyes to the potential of non-fungible tokens. Axiom Zen then spun out a company called Dapper Labs, which secured 15 million dollars in funding from top investors including a16z and Google Ventures. After witnessing the activity within the CryptoKitties community and seeing top investors pour money into Dapper Labs, people began to realize the true power of NFTs.

Unlike fungible cryptocurrencies like Bitcoins, NFTs are "one-of-a-kind" digital assets stored on a blockchain platform and can include images, videos, recordings, collectibles, and tangible items in the physical world.

Currently, NFTs are mainly used to sell digital art. Because digital art is so easily copied, it is difficult to tell which copy is the authentic "original". Therefore, up until recently, digital art hasn't had a collectible value. However, with NFTs, digital art can be attached to a unique number stored on the blockchain. The token can be sold to pass on ownership of the digital collectible, and provenance can be assured.

The example below shows the NFT "Jumping in The 50s" linked to the digital work "Happiness is contagious". This NFT was sold with a Dutch auction on the Mintable app platform at the base price of 0.0166 ETH (about 50 Euros). It should be noted that the original work is a printed photograph that remained in the possession of the photographer's heirs. Therefore, what was sold via the NFT is the derivative digital work (which, moreover, was digitally manipulated from the original).

The following were the rights connected with the NFT: the copyright was transferred to the buyer; the file was downloadable, and it was resalable. All these rights are regulated in the smart contract included in the NFT. As the copyright transfer is registered in the blockchain, the buyer can prove at any time that the use of the digital work by a third party constitutes an offense.

4. The market for the NFTs

NFTs, like all other tokens, are auctioned on platforms when they are issued. The issuer decides whether to resort to the auction with the relative duration or to set a price. Generally, these platforms also act as a secondary market.

Returning to CryptoKitties, the user/issuer "1970374" listed for sale the NFT connected to the "Buttercup Ughbip" digital cat on the Opensea platform for 60.00 USD. Mr. 1970374 had bought the NFT from user "grow23" on October 24, 2020, for the price of 0.005 ETH (2.06 USD). Mr. grow23, on its turn, had bought it at auction four days earlier for the same price in ETH.

In those four days, the dollar value of ETH had grown by 11.83%. Therefore, Mr. grow23 made a theoretical gain in USD despite buying and selling for the same price in ETH. If now Mr. 1970374 will be able to sell the NFT at least at the starting price of 60.00 USD, he/her will make a gain of 2.813%. Since, in the past, single digital cats have surpassed the price of 100,000 USD, it is not excluded that this will happen. This type of earnings is not surprising considering that in the first half of 2021 the NFT market produced an estimated sales volume in the order of 2.5 billion dollars.

Simon Yu, CEO of crypto cashback platform, StormX has explained this phenom-

enon in digital art as follows: «people want NFTs for the same reason they want a Picasso. They want to show it off to everyone. The difference with a digital asset is that you can showcase it to an unlimited amount of people – and prove irrefutably that you own it».

5. The future of the NFTs

NFTs are undergoing a process of maturation and there are still barriers to mass adoption.

One of these barriers is the lack of buyers and the market is still too much concentrated. An ocean of money is managed by a few wallets. Let's take the Yield Guild Games token sale in July as an example. They raised \$12 million from just 32 wallets.

Growth has also slowed down because the crypto world is still too complicated in terms of user experience. Purchasing an NFT is not as simple as downloading a track from iTunes. Users shall have a wallet and generally get some kind of cryptocurrency to make a purchase. Furthermore, when crypto transactions will be fully regulated, the lengthy tasks relating to compliance procedures such as Know Your Client, etc. will be added to the above.

Another barrier is the environmental impact of the blockchains. According to the Cambridge Center for Alternative Finance (CCAF), Bitcoin currently consumes around 110 Terawatt Hours per year — 0.55% of global electricity production, or roughly equivalent to the annual energy draw of small countries like Malaysia or Sweden. It is clear that it's not financially or environmentally sustainable to maintain such energy usage worldwide so the challenge for the blockchain networks is the ability to convert to alternative energy to try and maintain their profitability.

Finally, some argue that the enormous advertising noise around the NFT phenomenon is doing more damage than good to the market. Simon Yu, CEO of crypto cashback platform, StormX says that «Too much hype is never a good thing. When everything gets overblown, people just create entities for the hell of it. Then comes the press, and people get exhausted, which stops most people from seeing the true value behind it. This happened with crypto in late 2017».

If these barriers will be eliminated or, at least, reduced and NFTs will be used in an increasingly non-speculative manner, non-fungible-tokens could become the digital backbone of the economy as they should be linked to everyday activities like ticket sales, proof of attendance, battling fraud, collateral for paying bills.

6. Legal aspects

To determine which market assessment techniques should apply to NFTs, it is necessary to understand the legal aspects of those techniques beforehand.

Trying to anchor the notion of NFT to something we already know, and which simplifies the learning and management process for us is, in my opinion, a cultural resistance.

We can strive to qualify NFTs as certificates, stamps, pieces of an indefinite digital asset. NFTs are none of this or, rather, they are also a set of what is summarily listed. Understanding how NFTs technically work is essential to try to analyze the legal implications of this new technology.

NFTs are an asset in themselves and operate in a dematerialized environment (ecosystem as it is defined in the jargon) in their own right; therefore, it is not seen and not possessed in the physical or strictly private sense of the term. To learn to understand and understand NFTs, even before managing and disciplining them, it is necessary to overcome these cultural resistances and try to relate to something that cannot be seen, heard, touched but exists and, above all, has a commercial value.

There is no NFT without tokens⁸ and the use of smart contracts (i.e. computer protocol designed to perform programmed actions when certain ex ante-defined conditions occur) through blockchain technology. In other words: there is no NFT without DLT's technology, smart contracts and, I would add, crypto wallet (e.g., Ethereum wallet), i.e., a cryptographic address that exists only in the blockchain whose function is to store tokens (fungible like virtual currencies and, non-fungible like NFTs).

It is worth recalling that the terms “distributed ledger technology“ and “blockchain“ are sometimes used as synonyms, while in reality there is a distinction between the two, as blockchain technology represents a species of the broader genus of DLT technology. In this regard, in the European Parliament Resolution of 3 October 2018 on distributed ledger and blockchain technologies (2017/2772 (RSP) it is specified that «blockchain is only one of the various types of DLT [...]»).

Starting from this approach and reasoning in reverse, let us try to understand why NFTs are not at present comparable to anything that exists or know but they are a genre whose specificities must be traced in the way it is used and, before that, constructed, as well as in the use that operators in the sector are making of it.

6.1 NFTs operate in digital reality, and it is within this ecosystem that we must move.

We have seen that to understand NFTs it was necessary, first, to have to talk about tokens and the different types of tokens as well as distributed ledger technologies (blockchain). There are various blockchains, but when dealing with NFTs the most widely used blockchain is that of Ethereum even if there are many others.

A token is a piece of code that acts as a cryptographic representation of any object, and this code can be unique. Although it must be said, this uniqueness is quite illusory, just like the limited-edition lithographs.

NFTs use a token standard known as ERC-721. Many other standards may be relevant, especially for copyright issues, for example, the token standard for the transfer of ownership (ERC-173) but the most used for NFTs remains ERC -721.

Therefore, an NFT is a digital information materially represented by a string of

⁸ PWC, *Non-Fungible Tokens (NFTs): Legal, tax, and accounting considerations you need to know*, working paper, 2021.

non-replicable and exchangeable numbers. NFTs can be sold and purchased within a blockchain network using cryptocurrencies (Bitcoin, for example) for payment.

6.2 NFTs are not certificates comparable to dematerialized vehicle ownership certificates

The contract for the sale of movable property and those registered has a consensual nature in which the translation effect of the property occurs following the mere consent of the parties. The delivery of the goods and documents is therefore not a condition for the conclusion of such a contractual agreement, as it is not in the case of a sale on documents. This principle has been unanimously confirmed by the case-law of merit and legitimacy⁹.

The documents necessary for the registration of a car, always to remain within our example, are therefore not an essential requirement for the sale - which remains a consensual contract, as such, it is perfected by mere consent, possibly the method of “delivery of the documents against payment of the price“ may represent a tool to “induce“ the payment of the consideration for the vehicle but the nature of the contract remains unchanged.

This is to say that the certificate of ownership in the sale of motor vehicles does not have an economic value, it is not an asset, and it is not the object of the sale like what happens in real estate transactions.

The delivery of the documents necessary for registration would only constitute an accessory obligation of the seller according to art. 1477 of the Italian Civil Code but does not in itself determine the property effect of the trade.

In the same way, the NFT is not a certificate but the encryption of an intangible asset in which a series of data, information that has its own digital identity and value, due to its scarcity, is definitively saved. So, what is stored in blockchain technology is the information about the underlying asset that is not itself stored in the blockchain. In the blockchain, therefore, the history of the token remains.

The resulting NFT is mostly a piece of code that is written into the blockchain containing various bits of information. The ERC-721 standard contains elements that must be present and some that are optional. The first central element of the NFT is a number known as the tokenID, which is generated when the token is created; the second is the blockchain address (contract address) which can be viewed anywhere in the world using a blockchain scanner. There can only be one token in the world with the combination of these elements: the tokenID and the blockchain address; it is the combination of these two numbers, contained in the token, which makes it unique, and which gives it the value of scarcity and, therefore, of being, a bragging right.

In summary: the information related to a specific asset (tangible or also intangible) is stored “on-chain”, while the asset as such remains “off-chain”. This means that the owner of the tangible asset and the owner of the NFT may (usually this is what happens) not be the same. The relationship between one and the other asset can (but

⁹ Just to mention a few examples: Italian Court of Cassation, 29 November 1986, no. 7070; 9 November 1993, no. 11060; 1 June 2000, no. 7267; 22 March 2005, no. 6167; Court of Appeal of Turin, 4 March 2005.

does not have to) be regulated or conditioned with smart contracts. In the traditional market, the goods used to create the NFTs will continue to be transferred while in the crypto market the NFTs will be sold which, in the string of information that composes them, may even contain the conditions for resale (in this case, it will be the smart contracts that guarantee their effectiveness).

While the underlying asset (image, photo, video, artwork, etc.) is used to encode the NFT and make it uniquely linked to it, the NFT is not the asset, it is not the image, the photo, the video, or artwork, but the metadata that binds it to the original file. It is other but with its value, fluctuating and liquid.

In essence, anything that is capable of being digitized can be turned into an NFT. The original asset is only needed in the first stage of the process, which is to create a unique combination of an ID token and contract address. Once the NFT has been created, there is very little interaction between it and the original asset.

We, therefore, have two types of assets (“off-chain” resource / “on-chain” metadata), two markets (traditional / crypto), two currencies (fiat / virtual money), two modes of ownership (pure / mediated).

In NFTs, immateriality is such, also due to the mode of circulation of this asset; to speak of possession of an NFT in the proper sense according to art. 1140 of the Italian Civil Code it is very complex and, perhaps, misleading. One could therefore opt for a mediated possession in which the *animus possidendi* is held by the owner, but the NFT is stored in the blockchain.

Not to be forgotten is that the underlying technology supporting DLTs is not owned by anyone, which means that anyone can create and run their blockchain network or can join an existing one.

The NFT is a metadata file that has been encoded using a digitized underlying asset and it is this metadata file that is purchased. It is, therefore, the (non-fungible) token that identifies the good/ the work that is transferred, not the underlying asset as such and, its value is partly conditioned by the so-called bragging rights, that is the “right to be able to boast” of being the sole holder of a specific NFT.

When someone buys an NFT they are buying metadata. So why say NFTs are certificates? Because it helps us to “see” them, to make them concrete, but it is an imprecision that can have repercussions on the management, including negotiation, of this new asset. Equating NFTs with certificates based on the information encrypted and traced in the blockchain is the daughter of that cultural resistance mentioned above.

But if the NFT is an asset/a good/ a compendium of assets with an economic value, this means that: I could seize it, it could be the subject of a guarantee, it could be contributed to the share capital of a company, it should be recognized in the balance sheet items.

The value of NFTs depends in addition to the attribution to a certain author, brand, gift, etc. also by its intrinsic scarcity. It is the aura of the unique piece even if, from a certain point of view, it is illusory, considering that you can have several digital copies of the work used to generate the token. It is the NFT generated by a specific digital copy that becomes unique.

6.3 Copyright issues (The NFT is not a work)

There is nothing creative in the tokenization of an asset given that, as we have seen, they are metadata files that contain a (unique) combination of tokenID and contract address.

There may be patent protection for the coding process, but this is different from the authoritative protection of NFTs.

NFTs as such are not a creation protected by copyright law and, at the same time, do not in themselves create copyright issues concerning any underlying work (except in cases where they contain unauthorized links to the digital version of the work) because they are not a transformation, adaptation, or translation of the same work.

In code-only NFTs, the original work was only used to create non-fungible metadata: a string of bits, i.e., numbers. At most, we could be faced with some form of communication to the public¹⁰ but not plagiarism or counterfeiting of the original work because there would be no copy or representation of the work in the NFT.

Therefore, if the digitization of the work had been used (digitization which then served to create the token) without the authorization of the owner of the economic exploitation rights of the work (for example illegally downloaded music files or copies only licensed for private use), if there are no links to the digitized work in the NFT, it is difficult to hypothesize copyright infringements.

However, the case would be different for those NFTs that do not underlie a previous tokenized work, but this is loaded entirely on the blockchain. These are exceptional cases because the costs of writing the data of the entire work in the blockchain are prohibitive. Therefore, if the work is native to the blockchain, any NFT of the work without authorization from the owner would have authorial implications because in this case, the NFT would be the work.

Returning to the “classic version of the NFT”, that is, the one that presupposes a digitized work in the tokenization process, in these cases the NFT can contain additional information such as, for example, the name of the tokenized work, the name of its author, whether the original work has fallen into the public domain or is still protected by copyright law, and any other details that you want to include. It is very common to add a link in the NFT, the URL to the original work, or the hash of the images used to create the NFT (this happens because the NFT is not the original work).

This, as mentioned, happens for those NFTs that require prior digitization of the work (or, more generally, of the asset) which they then want to tokenize.

Information that is included in an NFT is not intrinsically true.

The apparent simplicity in the technical implementation of an NFT involves the (at least potential) risk of NFTs containing incorrect, partial, or unauthorized data due to the absence of prior verification by the person who first created the token. The mere circumstance that there is some information or data concerning the ownership of the underlying work/asset and included in the blockchain does not mean that such data

¹⁰ A. Guadamuz, *The Treachery of Images: Non-fungible tokens and copyright* NFT, cit.

are true and/or exempt from disputes that could even be already in progress at the time of the tokenization of a work or part of it. From this point of view, scenarios would also open concerning the liability profiles of the platform, completely like what has already occurred (and, only partially, resolved) with the more traditional marketplace platforms (Amazon, eBay, etc.).

It is for this reason that NFTs entered the blockchain circuit by accredited entities is already in itself a value that can affect both the NFT's sale price and the number of transactions and, therefore, the royalties generated.

Let's go back to the case of NFTs that contain the URL to the digitization of the underlying work, that is, of those NFTs that are not just code but retain a link to the work used to create it. In these cases, the token has a link that allows you to find the file that is not normally found in blockchain technology but cloud services.

In these cases, the presence of the link and the ability to access the file would theoretically imply (then it would be necessary to examine case by case) an unauthorized reproduction of the work and communication to the public; in the latter case, however, it would be difficult to identify which is the new public (the links may be difficult to access and, above all, it is not certain that it is public access) and the entity as well as the composition of the same (specialized technicians, simple Internet users or other). In this regard, it is worth remembering that the Court of Justice of the European Union, called upon to rule in a Dutch dispute (C-610/15) on the interpretation of art. 3, paras. 1 and 8, and para 3, of the Infosoc directive (2001/29/EC) on the harmonization of certain aspects of copyright and related rights in the information society, as well as on art. 11 of the Enforcement Directive (2004/48 / EC), which governs the sanctioning aspects and jurisdictional remedies regarding the protection of intellectual property rights, held that the making available and management of a peer-to-peer online sharing platform, such as "The Pirate Bay", constitutes a "communication to the public", with the consequent infringement of copyright in respect of the works shared, the use of which has not been authorized by the holders of the rights of economic exploitation of those works.

Concerning the notion of "communication to the public", the broad meaning is highlighted, while noting the presence of two constant elements, namely the "act of communication" of a work (the action that allows access to a protected work without which it would not be possible to enjoy it) and the communication of the latter to a "public" (intended as an indefinite and rather considerable number of addressees), specifying that one or the other of the aforementioned elements must be "different": thus, either the communication must be made by technical means not previously used, or there must be a new public, i.e. a public that has not already been taken into account by the copyright holders at the time they authorized the initial communication of their work.

It would also be interesting to ask about the possible responsibility of the miner of the blockchain or of the marketplace platform in which the offers of the NFTs for sale are hosted (OpeanSea, Crypto, Mintbase, Nifty Gateway, etc.), especially if it were possible to demonstrate the knowledge on their part of the illegal use of the link.

There are platforms for the creation of NFTs (Maintable, for example) which in the

tokenization process of the original work allow for the transfer of copyright to be included in the smart contracts (ed. on the work underlying the NFT); this would mean that at each transaction there would be the simultaneous transfer of the rights of economic exploitation of the work or the license of the same.

The NFT is not the license, it can be used to prove ownership of the NFT, and therefore to prove to the owners of the work that they can undertake commercial activities using the original work if data entered into the blockchain is correct. A token is not the ownership of rights and does not automatically confer or grant a license.

However, the use by these platforms of extremely generic formulas for the transfer of copyrights (for example: “transfer copyright when purchased?”, a formula used by the Maintable platform) raises serious doubts on the effectiveness of the transfer in the event of a dispute¹¹ and, in the case of our legal system, the doubts would also concern the written proof for the transfer required by art. 110 Law on the protection of copyright (Law 22 April 1941, no. 633 – so called “LDA”) given that the transfer of rights would be made possible through a computer code.

Limits that on a purely theoretical level could be resolved by formalizing the transfer of copyright or the license in writing (therefore in fact anticipated for NFT and then structured in a traditional contract). Hypothesis, however, is difficult to apply both due to the impossibility of a coincidence in terms of time (the transactions of the NFTs can be multiple even several in the same day) and where disputes arise for which the smart contract would contain certain information and functions not resumed (or contested) in the paper agreement which, therefore, may not be finalized. For this reason, the adoption of hybrid forms is not recommended.

To argue that together with the NFTs not only the ownership of the digital file is transferred but the new owner has the right to destroy the original work leaving the NFT as “the only form left“, is a fiction as well as an aberration, without forgetting the problems on the moral rights of the artist concerning the destruction of the work or even the mere threat of destruction.

Injective Protocol purchased a Banksy work (“Morons (White)” 2006) from Tagliatella Galleries in winter 2020, during a sale dedicated to the street artist, for about USD 95,000. Then he “converted“ the work into NFT and burned the original. The company justified the gesture on the basis that if the work had not been burnt, the value would have remained mainly in the physical work, rather than in the digital assets. The NFT reached a value of \$382,000, corresponding to 228.69 Ether - which is the most widely used cryptocurrency in DeFi’s operations - paid by an anonymous buyer.

The provocation launched by Daystrom - the online bank that singer David Bowie launched in 2000 - should be put on the same level.

In this case, it was the winning bidder of an NFT of a drawing by Jean-Michel Basquiat (“Free Comb with Pagoda”). The original 1986 work was purchased privately in 2015 for an undisclosed sum (the name of the collector is not even known) and had already been authenticated by the deceased artist’s foundation in 2002. The NFT was offered on OpenSea and, through a smart contract, granted the buyer the purchase of

¹¹ *Ibid.*

all copyright and the right to opt for the destruction of the original physical work. The NFT was withdrawn from the auction that was to take place between 26 and 30 April 2021 - after the artist's legacy claimed rights to the work and denied the assignment of copyright to the original of the sold work.

The extreme action of burning a valuable work with the intent of preserving only its digital version demonstrates one of the main interests that revolve behind the world of blockchain and NFTs: a new means of artistic expression, a new form of art.

6.4 NFT and art

A relevant problem in the art market concerns the authenticity of a work and its attribution to a particular artist or its opposite, that is, the disavowal of the work wrongly or surreptitiously attributed to a particular author.

The declaration of authenticity may come from the artist, if he is still alive, who normally signs a photograph of the work (more complex is the issue of the certificate of authenticity for ephemeral works or those emerging without tangible support). It can also be issued by the artist's heirs or by archives, foundations, galleries, or by any other agent appointed by the artist or heirs to catalog the works.

When the artist is unable to authenticate a work of art, its authenticity can only be the subject of an opinion, usually particularly qualified (called expertise).

The judicial request aimed at ascertaining the authenticity (or non-authenticity) of a work of art would not even be admissible in Court because this request would not be based on a right that has already arisen but on a mere factual situation; therefore, the judge would be called to rule on a fact and not on a right (there is no right to the authentication of a work of art with consequent judicial power to ascertain authenticity with *erga omnes* validity and capable of becoming *res judicata*).

If the artist is unable to authenticate a work or deny it, authenticity, therefore, can only be the subject of a qualified opinion.

Such opinions, as mentioned, cannot be "objectified" in a judicial sentence because this ruling would be based on mere advice, albeit from experts, and therefore would be reduced to the greater or lesser level of conviction that one expert opinion may have compared to another. Therefore, unable to rise to historical truth given their purely subjective nature.

The NFTs related to the world of works of art would partially solve these difficulties as the cryptographic data permanently and unchangeably contained in the blockchain would concern not only the previous transactions but also the data of its author and that is why the NFTs are (even if improperly for the reasons mentioned above) associated with the "certificates" and, generally speaking, it is said that it is the dematerialized version of the certificates of work. Therefore, we could say that in the world of art NFTs incorporate with a certain temporal value the expertise but are not reduced to mere digitization of this type of qualified opinion.

NFTs in the sector of the most modern art forms (installations, performances, land art, etc.) can help to solve some practical problems, for example, the obligation fore-

seen for some works falling within the scope of the works protected by art. 64 of the Code of Cultural Heritage to provide certificates of authenticity for their circulation (identity card of such works or passport). It is very difficult to guarantee when a dematerialized work is authentic, think for example of the invisible sculptures, entitled “To sono”, by the artist Salvatore Garau. This sculpture, totally immaterial and intangible, was sold for 15,000.00 euros. The buyer only got a paper certificate of ownership, nothing technological. In the catalog, the only visual element is a white space; the concept of work of art and *corpus mechanicum* should be discussed.

In these cases, the instructions relating to the specific installation can be contained in the smart contract connected to the single and unique NFT. Even in this case, the NFT would not be the work but the compression of a series of information, including its authenticity, which necessarily presupposes the existence of the work without becoming either a translation or a different representation of it.

Sometimes it can be the authors themselves who disown a work previously recognized as authentic; this can happen because of disagreements with the gallery or for the most varied reasons with consequent repercussions on the commercial value of the work itself. NFTs are capable of solving this problem definitively, apparently because the data inserted in the blockchain, as already mentioned, can be false or wrong, making it impossible to intervene (moreover, NFT is a non-fungible token, so one could not even create its twin without bugs). These are open issues that do not only concern NFTs but, more generally, the blockchain and the respect of the principle of transparency.

Ultimately, blockchain technology can help to bring certainty about the authorship of the work and the transfer of copyright only in the context of (native) digital art or art that has been digitized and tokenized directly by the artist; however, certainty will be more difficult to achieve in the case of digitization and tokenization performed by third parties.

6.5 NFTs in the art market would solve the resale right question

This is a very interesting aspect that NFTs seem to solve or, in any case, contribute to the effective recognition of remuneration to artists for sales of works after the first commercial transaction.

The resale right, which does not exist in all legal systems (it is excluded in Switzerland, South Korea, Japan and partially excluded in the State of California) is the right of the author of a work of art to receive a part of the sale price each time his/her work is sold and applies only to transactions carried out with the intervention of an art market intermediary and for sales after the first one. Furthermore, at least three years must have passed since the first sale, which must have taken place for a price higher than 10,000 euros¹².

¹² S. Stabile-E. Del Sasso, *Il diritto di seguito nel mercato primario dell'arte contemporanea*, in *Il Diritto Industriale*, 6, 2012, 507.

The effectiveness of the use of NFTs in this sector is not limited to the resale right but includes, more generally, the system of payment of royalties and, this is made possible thanks to the ecosystem in which NFTs operate: blockchain and smart contracts, that is the right to receive royalties for each transaction, a right “written” in smart contracts that allows authors but, not only them, to receive immediate payment in their crypto wallet without the need for other intermediaries.

This architecture is not only more effective from the point of view of the certainty of obtaining the payment of royalties but it is also more profitable for the authors because the platforms leave a wide choice as to the remuneration percentages and, above all, there is no prior limitation linked to the price of the original work (this, as already clarified, is also because it is not a question of sales of the work but one or more NFTs) which, as known, is only rewarding for established artists and not for emerging ones.

The applications of royalties linked to NFT transactions can be varied; this is the case of a French musician (Jacques) who created an NFT for every second of his song called “Vous” (in total 191 NFTs were made). Each NFT can be purchased by a different person, therefore, 191 fans of the singer can each buy a not-fungible token representing one second of the song. Each of them will receive shares from the royalties obtained from the profits generated by the song (the NFT would represent an effective share of the profits of the song) and, these royalties will be paid automatically, in Ether most likely, directly into the crypto wallet of the owner of each NFT (0.51% of the royalties for each token).

Traditional auction houses see NFTs as a significant opportunity, given that NFT works do not incur costs related to the management of physical works of art (for example storage, cataloging, and insurance). In this regard, according to some statements released by Christie’s representatives, in the future, there will be an increase in the supply of NFT works, but this does not mean that they will replace traditional art at auctions; eventually, there will be competition between traditional work and digital correspondent with consequences (and inevitable) reflected on the value and, on the selling price of the traditional work.

6.6 NFT branding, advertising, and token economy

NFTs could prove to be an excellent system to amplify the authority of a brand, its recognizability, and its value and, therefore, not only its (main) function of origin but also that, no less essential, linked to the communicational message associated with it. This function is consistent with the motto “Communicate better and at lower cost”. When it comes to NFT, blockchain, and digitalization, one should not reason by trying to break down the individual elements that compose it, a useless and even impossible effort, but it is necessary to change approach and reason in terms of a digital interaction able to contain the germ of new business models and, therefore, opportunities not only for growth but for companies to remain on the market.

The NFT, for example, can be used to reduce the costs of advertising investments

today mostly based on the Google or Facebook sales algorithms.

Companies can use the reward system of royalties generated by NFT transactions (as we have seen, the NFT gives ownership rights on digital objects to make them unique and traceable) to interact with their audience (consumers, service users, etc.) by making them participate and rewarding them with a unique token that they can transfer to third parties and, therefore, in turn, earn money.

The use of NFTs in shared virtual reality¹³ would not only preserve the market but also expand it and, not least, provide almost immediate feedback on business decisions.

Today, the use of metaverse and NFT are mainly used in gaming: “play and win” applied to overcome the costs, on the user-player side, related to software licenses and, on the publisher/game developer side, to increase profits from the use of the game.

These systems work by offering the most skilled or loyal players an infeasible token (NFT) representing a digital asset of the game (a sword, a magic wand, etc.). These in-game assets are no longer purchased by the player but become rewards for loyalty to the game or the individual player’s skills. These NFTs can be transferred to third parties, and, for each subsequent transaction, they guarantee a percentage of the transfer price. The publisher of the game charges a commission on these exchanges, and this is its profit which, in perspective, can be much greater than the revenue generated by the software licenses (the game “axy infinity” works in this way and the Philippines alone already has 2 million players).

This model can be applied to different sectors. Tokenomics or token economy is based on the conviction of the users or investors of a project that the resulting token can help build a more sustainable economic ecosystem, for example. Some people buy or sell that token for different purposes, for example, to vote on initiatives for the future of the project, the important thing is that there is interoperability.

In the future, this model can be applied to a wide range of sectors, where the beneficiary of the NFT will not only be rewarded by the income generated by the digital asset but will also be able to take an active part in the company’s commercial policies. The NFT will become a collector of strategic information for companies¹⁴.

6.7 Concluding legal remarks

NFTs are not the dematerialization of work or a part of it, nor a translation or a different form of representation.

Materially, we have seen that there may be no tangible specimen, or the underlying asset could be reproduced an infinite number of times (think of NFTs on design or fashion objects) but thanks to NFTs, scarcity is created and, therefore, its value. However, unique is not the tokenized asset / tangible but the NFT which is not a fiction or a declination of what already exists but is something else, another asset that

¹³ S.J.Bolton-J.R. Cora, *Virtual Equivalents of Real Objects (VEROs): A type of non-fungible token (NFT) that can help fund the 3D digitization of natural history collections*, in *mapress.com*, 2021.

¹⁴ I.F. Kanellopoulos-D. Gutt-T. Li, *Do Non-Fungible Tokens (NFTs) Affect Prices of Physical Products? Evidence from Trading Card Collectibles*, cit.

is transferred thanks to and through the blockchain network and, therefore, its value is affected of the fluctuations of the virtual currency. Open and unresolved issues are those related to VAT (not only concerning territoriality but also about the rate and, even before that, to tax liability), anti-money laundering, and, last but not least, the environmental impact, given that this new technology involves significant CO₂ emissions and this does not fit in with the green economy policy (according to recent studies, the minting of an NFT would lead to even greater CO₂ emissions, that is equal to about 48 Kg).

Regarding the fight against money laundering, the Justice Commission of the Italian Parliament, on 20 October 2021 had given a favorable opinion to the draft legislative decree implementing Directive (EU) 2018/1673 on combating money laundering through criminal law. Concerning the submitted text, the Commission had given a favorable opinion with the following observation: «consider the opportunity to introduce legislation that can adapt the instruments of control and repression of crimes regarding crypto-currencies, which similarly to other assets can constitute money laundering conduct, thus ensuring the legislative uniformity of the intervention». On 8 November 2021, Legislative Decree No. 195 was published, which transposed Directive (EU) 2018/1673, which, however, did not take into account what was expressed on 20 October by the Justice Commission.

Currently, there is no specific regulation dedicated to NFTs, but it should be noted that the “Digital Finance Package” launched by the European Commission on 24 September 2020 included a Proposal for a European Regulation on crypto-assets markets aimed at amending Directive (EU) 2019/1937 which, to date, is still under discussion in the Council. At the domestic level, on 2 January 2020, Consob’s Final Report on crypto assets, while not going so far as to define the different types of NFTs excludes mere tokenization from the list of financial instruments.

A list of NTFs is recalled in Appendix 1.

7. Market valuation of the NFTs

As described above about the business and legal aspects, NFTs can come in different forms and represent different rights. Furthermore, their use is relatively new, they can be utilized across many areas and the market is still too much concentrated.

All these features still make the market valuation of NFTs difficult.

«None of the basic metrics you would use to value private companies or traditional investment vehicles like shares or warrants are available for NFTs» said David Larsen, CPA/ABV, managing director of the Alternative Asset Advisory Practice at Duff & Phelps, a Kroll business. «For an NFT, what the last buyer paid for it gives you an indication of what the value is, but the next buyer could pay something else, and it is the amount the next buyer will pay that determines the value».

At the time of its creation, the value of an NFT may be dependent on the characteristics of its creator. If we take an NFT linked to a work of art, its initial value is higher the greater the fame of the artist. Among other things, it is interesting to reflect on

how and why the value of a digital asset linked to a work of art is different from that of the original work.

Another approach could be to take the value of the NFTs owned by the owner at any given time as a comparison. However, given the volatility of digital assets, date and time become fundamental factors influencing valuation.

Furthermore, it may help self-created NFTs to consider the cost incurred for their creation and market launch.

Finally, if an NFT's trades are settled in an actively traded cryptocurrency, its value will be affected by that of the cryptocurrency itself.

All these considerations mean that the NFT evaluation techniques are still to be explored and understood as indeed the NFTs themselves.

On the other hand, the panorama of blockchain evaluations is clearer, as will be seen below.

8. The legal nature of a blockchain as a prerequisite for valuation

A blockchain does not represent a firm but a semi-public good (being a public or private blockchain) that is shared among different stakeholders that co-create value participating in the construction and implementation of a sequential pattern of codes. The evaluation of a blockchain is so very different from that of a firm or an asset.

«In general, companies are favoring private Blockchain implementations as they construct proofs of concept and pilots. The logic of this is easily discernible: closed-wall ecosystems have the appearance of greater security, especially when confronting the unknown. While proponents of public infrastructure networks such as Bitcoin, Ethereum, and others sometimes do not see value in these experiments since they do not materially add to the transaction volume or overall immediate usage of the public network, this may be short-sighted. One thing that Blockchains do extremely well is allowing entities who do not explicitly trust one another to collaborate in a meaningful way. Public Blockchains can already make this claim; however, they currently fall short of requirements such as privacy and scalability. Private Blockchains can provide solutions for these shortfalls and enable greater privacy and transaction throughput because all the nodes are strictly controlled. However, there is a trade-off—they do so at the cost of their ability to connect all to the network. Still, for any organizations seeking to move to Blockchain, starting with a permissioned Blockchain network (private) can be highly beneficial to support specific business needs. Long-term, organizations should seek interoperability standards between their private Blockchain and public networks, resulting in a much stronger ecosystem overall»¹⁵.

The legal nature of the blockchain is important for its valuation. There are three main kinds of blockchain:

1. Public;
2. Private;

¹⁵ In *medium.com*.

3. Consortium.

Public blockchains are non-marketable and so it is difficult to assess their potential value; they may have a figurative value that emerges from the public savings that they make possible.

A private blockchain may be owned by a firm, and valuation patterns may follow its innovative revenue model. Revenues deriving from new businesses are hard to assess since they lack the historic background and are not clear-cut. Profit streams may derive from subscriptions, pay-per-use income, performance-based fees (cashing in part of the savings of the blockchain users), or extraction of validated big data (sold outside for vertical advertising; e-commerce applications, etc.).

Public blockchains lack ultimate private ownership and may be harder to evaluate. They represent the only fully decentralized model.

Semi-public blockchains may somewhat resemble consortiums. A consortium is an association of two or more individuals, companies, organizations, or governments (or any combination of these entities) to participate in a common activity or pool their resources for achieving a common goal. This may be consistent with blockchains, joint ventures, and company networks and value co-creation paradigms, so representing an innovative business model. Different stakeholders¹⁶ may join to set up co-opetition, merging cooperation competition. It is used when companies otherwise competitors collaborate in a consortium to cooperate on areas non-strategic for their core businesses. They prefer to reduce their costs in these non-strategic areas and compete in other areas where they can differentiate better. The value of consortium membership is typically represented by the private rents that any participants can extract from it since the consortium is a non-profit alliance.

The business model of the blockchain influences its peculiar corporate governance issues¹⁷. Stakeholders may be linked by their peer-to-peer (P2P) interactions and in general are not represented by the ordinary stakeholders that rotate around a firm (shareholders; debtholders; employees; managers; suppliers, clients, etc.). Whereas value co-creation is typical of digital businesses, sharing of co-created value may not follow a similar pattern. For example, social networks are based on shared information (personal data) that platforms can monetize unilaterally, with the tacit and unaware consent of the participants. Blockchains work differently and their decentralization prevents the abuses of a pivoting platform and minimizes information asymmetries.

«Consortium blockchains differ from their public counterpart in that they are permissioned, thus, not just anyone with an Internet connection could gain access to a consortium blockchain. These types of blockchains could also be described as being semi-decentralized. Control over a consortium blockchain is not granted to a single entity, but rather a group of approved individuals. With a consortium blockchain, the consensus process is likely to differ from that of a public blockchain. Instead of anyone being able to partake in the procedure, consensus participants of a consortium blockchain are likely to be a group of pre-approved nodes on the network.

¹⁶ K.B.Wilson-A. Karg-H. Ghaderi, *Prospecting non-fungible tokens in the digital economy: Stakeholders and ecosystem, risk and opportunity*, in *Business Horizons*, 64(5), 2021.

¹⁷ D. Yermack, *Corporate Governance and Blockchains*, in *Review of Finance*, 21(1), 2017, 7 ss.

Thus, consortium blockchains possess the security features that are inherent in public blockchains, whilst also allowing for a greater degree of control over the network»¹⁸. Each stakeholder has an interest in the decentralized blockchain and gets monetary or non-monetary remuneration from her or his participation. Stakeholders are like the participants of a consortium (so being deprived of any economic gain target) and may share the services and information that the blockchain offers or might be remunerated with crypto-assets¹⁹ (digital virtual units mainly represented by tokens or crypto-currencies).

What matters is the capital gain or value-added that each participant can grasp in terms of incremental (differential) income through the exploitation of the blockchain. It is in effect difficult to evaluate a blockchain for itself since it does not represent – as stated above – neither a firm nor an asset, being a sharable good among its participants.

8.1 Economic and financial valuation

The appraisal of a blockchain is propaedeutic to any NFT assessment²⁰ and must consider first its legal nature: public blockchains differ from private or consortial ones. The business model, with emphasis on the revenue model (where do profits come from?), is another prerequisite for valuation. Industry applications exemplified in par. 1. may give precious hints for valuation.

The ideal scenario would be that of incorporating the prospects of the blockchain into a traditional accounting system (pro forma balance sheet interacting with forecast income statements to get expected cash flow statements). This is however hardly possible in most cases, and so a different route should be followed: instead of considering the blockchain *per se*, the evaluation might tackle the economic and financial savings (in terms of lower costs²¹, higher availability, and speed of data, etc.) for the users.

The valuation of a blockchain is linked to that of a database or, analogically, to the appraisal of big data that fuel the blockchain with information that becomes secured (so increasing its value). A blockchain is a peculiar database that is reticular and has an incremental dynamic, being deprived of any center of gravity, since its equilibrium is constantly pushed forward, each time that a block is added.

The extension of a networked blockchain adds up value, in analogy with Metcalfe's law.

Since the blockchain incorporates information, it is naturally linked to (big) data and related to the data sourcing IoT that can be extrapolated and used, as a by-product, for

¹⁸ In *mycryptopedia.com*.

¹⁹ In *ey.com*.

²⁰ M. Dowling, *Fertile LAND: Pricing non-fungible tokens*, in *Finance Research Letters*, April 2021; Id., *Is non-fungible token pricing driven by cryptocurrencies?*, *ivi*, April 2021.

²¹ The traditional cost-centric approach must be replaced by a value-focused perspective: Y. Zhang-J. Wen, *An IOT electric business model based on the protocol of bitcoin*, Proceedings of 18th International Conference on Intelligence in Next Generation Networks (ICIN), Paris, 2015, 184 ss.

complementary value-added strategies.

Hence the collateral value of blockchains that in most cases depends on their complementary applications, rather than on their existence.

Blockchains merge product and process innovation, creating a validation process that increases the value of data. The evaluation criteria may consider the estimation of traditional intangibles like patents or trademarks, with a fine-tuning that tries to capture their peculiar nature.

The object of the appraisal may concern either the blockchain as an asset (belonging to identified shareholders and being incorporated in a firm) or the value that the blockchain brings to an external user.

8.2 General valuation methodologies

The classification of the main financial / market evaluation methods is consistent with international accounting principles; according to IFRS 13:62, three widely used valuation techniques are:

- market approach – uses prices and other relevant information generated by market transactions involving identical or comparable (similar) assets, liabilities, or a group of assets and liabilities (e.g. a business)
- cost approach – reflects the amount that would be required currently to replace the service capacity of an asset (current replacement cost)
- income approach – converts future amounts (cash flows or income and expenses) to a single current (discounted) amount, reflecting current market expectations about those future amounts.
- These general approaches should consider the peculiar nature of blockchains. For example:
 - the market approach seems still uneasy to be used since there is no active market for private or consortial blockchains;
 - the cost approach may give some useful insights (how much would it cost to create a similar blockchain from scratch?) but again it seems difficult to link it to the appraisal;
 - the income approach that considers future earnings/cash flows is theoretically suitable even if it is difficult to sort out the basic accounting data behind it. It should also be mentioned that traditional appraisal parameters for intangibles, like royalties, are hardly compatible with blockchains.

In some cases, a single valuation technique will be appropriate, whereas in other states of the world multiple valuation techniques will be appropriate [IFRS 13:63].

The income approach is based on the incremental income (deriving mainly from cost savings) that is linked to the use of a blockchain. The benefits should also consider the saved time or the lower collateral costs since the “blockchained” data is more reliable. A complimentary evaluation pattern might consider the appraisal techniques traditionally used for databases (that represent the most similar intangible). The value of a database can be extracted from its use by different adherents, again with value co-cre-

ation patterns that rotate around the blockchain and are represented by feedbacks, data sharing, information that needs to be harmonized with data fusion, and interoperability, etc.

The blockchain evaluation is highly uncertain also because cash flows are difficult to estimate.

The cost approach might consider the savings for the users, in terms of lower costs, higher speed and reliability of data, etc. Further considerations will be made in Table 1.

8.3. Financial evaluation

A comprehensive model for the evaluation of intangibles considers their economic (incremental) marginality as a starting point to assess the capacity to generate liquidity. Coherently with IAS 38 prescriptions, DCF is the key parameter for both accounting and appraisal estimates, so representing the unifying common denominator of cost, income, or market-based methods, which regularly need to find out their cash part.

A synthesis of the market, cost, or income approach may be found in a financial appraisal methodology (consistent with a more general evaluation of a firm) where the estimate is based on the capacity to generate liquidity, remembering that «cash is king»²².

Market valuations may use as preferential methods either DCF or directly an EBITDA multiplier, inspired by (intrinsically uneasy) comparisons of intangibles. DCF theoretically stands out as the optimal method, being inspired by the golden rule according to which “cash is king”.

DCF is ubiquitous in financial valuation and constitutes the cornerstone of contemporary valuation theory²³. The robustness of the model as well as its compatibility with the conventional two-dimensional risk-return structure of investment appraisal makes it suited to a multitude of asset/liability valuations. Accounting standards across the globe recognize the efficacy of this model and advocate its use, wherever practicable. FAS 141 and 142 of the United States and IAS 39 that relate to the accounting of intangible assets, also recommend the use of DCF methodology for imputing a value to such assets.

Market evaluations also frequently use a standardized EBITDA multiplied over time (from 2/3 up to 15 or more times/years, in exceptional cases) and this (apparently) simple multiplication brings to an Enterprise Value (EV), attributable to debt-holders and, residually, to equity-holders. This approach is consistent with the accounting nature of EBITDA, which is calculated before debt servicing.

EV / EBITDA multipliers may be connected to price/book value or Tobin q parameters, which reflect the differential value of intangibles under a hypothetical cost reproduction hypothesis, so representing a precious bridge between otherwise discon-

²² Cash is king is a motto reflecting the belief that money (cash) is more valuable than any other form of investment tool, in *investopedia.com*.

²³ J. P. Singh, *On the intricacies of cash flow corporate valuation. Advances in Management*, 2013, 6(3),15–22.

nected market and cost appraisal methods.

As a rough calculation, the EV multiple serves as a proxy for how long it would take for the complete acquisition of the entire company (including its debt) to earn enough to pay off its costs (assuming no change in EBITDA and a constantly added value contribution from the IC portfolio). Temporal mismatches between the numerator and the denominator may bias the ratio and should accordingly be minimized.

Equity and debt value may be jointly inferred from an EBITDA multiplier, which estimates EV, and, after deduction of the market value of debt, residual market value of equity.

The stream of (hopefully) growing and not ephemeral Operating Cash Flows - CFo - (marginally attributable to the intangible strategic contribution to the overall value) incorporates growth factors, whereas the weighted average cost of capital (WACC) discounting denominator embodies market risk elements, as recognized by debt and equity underwriters. Moreover, cash flows are a cornerstone of debt service, as it will be shown later. Qualitative issues, such as consistency, durability, depth of coverage, etc., concerning IC, may strategically impact future EBITDA, cash flows, and consequent value. WACC may also be affected by the asset substitution problem and inherent wealth transfer from debt- to equity- holders (or vice-versa), as it will be shown in the next paragraphs.

What matters, should the valuation consider only IC marginal contribution to the overall company's value, is just described by differential/incremental CFo or EBITDA, made possible by IC strategic contribution, which is, however, often uneasy to isolate. Residual incremental value, not attributable to specific IC components is allocated within the goodwill cauldron.

Being CFo derived from EBITDA, the link between key market methods (possibly complementary, rather than alternative) is evident. This is a significant, albeit trivial, finding, somewhat misperceived by the current literature, with an important impact on IC valuation. Figure 9 shows the functional links existing at the level of the profit and loss, balance sheet, and cash flow statement.

Calculation of expected benefits with Net Present Value (NPV) is given by the following formula, considering NPV accruing to equity-holders:

$$NPV_{\text{equity}} = \sum_{t=1}^n \frac{CFN_t}{(1 + K_e)^t} - E_0$$

where:

- CFN = Net Cash Flow; t = time; K_e = Cost of equity; CF_0 = initial investment
- NPV is (also) used in the cost method

Proper calculation of NPV should include even the other factors, incorporating in Net Cash Flows geographic limitations, restrictions, exclusivity, etc.

The synthesis between the two methodologies may be represented by the calculation of Operating Cash Flows that also reflect the impact of scalability. Liquidity is calculated considering the accounting interaction of the changes in the balance sheet with the current income statement. Blockchains are expected to improve the EBITDA

through higher revenues and lower costs.

8.4 “With or Without” Incremental Valuation

The incremental evaluation can be considered by external users of the blockchain that incorporate its functions in their (traditional) business model or simply use the certified data.

The “with or without” methodology is currently used in the evaluation of intangibles and estimates the fair value of an asset by comparing the value of the business inclusive of the asset, to the hypothetical value of the same business excluding the asset. Blockchains may impact both revenues and costs. Their economic and financial (incremental) marginality may be represented in Table 1.

Table 1 – Impact of blockchains on Economic and Financial Marginality

Economic / Financial Marginality	Standard Company	Blockchain Extension
Revenues	These parameters depend on the traditional business model of the firm, without the impact of the blockchain applications	<ul style="list-style-type: none"> • New business models and opportunities • real options of expansion and development
- Fixed monetary costs		<ul style="list-style-type: none"> • Validation of data can decrease costs and speed up processes, with time savings
- Variable monetary costs		<ul style="list-style-type: none"> • Economic and financial marginality grows because of higher revenues and lower costs
= EBITDA		<ul style="list-style-type: none"> • Blockchains may shorten the supply chain, making payments easier and quicker, so reducing the accounts receivable and payable. Even the stock might be decreased.
+/- □ Operating Net Working Capital (NWC)		<ul style="list-style-type: none"> • Blockchains may reduce some fixed investments, with a positive consequence on some fixed costs and depreciation.
+/- □□ Net Investments □□ Capex)		<ul style="list-style-type: none"> • Liquidity may increase because of the higher EBITDA and lower NWC and Capex
= Operating Cash Flow		

EBITDA and Operating Cashflow are the cornerstones of the two main evaluation criteria.

9. Concluding remarks

An NFT can be defined as a unit of data stored on a digital ledger, called a blockchain, which can be sold and traded. The NFT can be associated with a particular digital or physical asset (such as a file or a physical object) and a license to use the asset for a specified purpose.

An analysis of the business model and the legal aspects is propaedeutic to the market valuation. To the extent that NFTs remove intermediaries, simplify and validate transactions, and create new markets, they can be used for several valuation purposes, according to the stakeholder involved (creator/artist; consumer, etc.). Each segment of the value chain is presided by a stakeholder that is linked to the other by real-time digital interactions and value co-creation patterns. This is consistent with the trendy “creator economy”²⁴, according to which Internet users share digital content through platforms that they collectively own and operate. Decentralized networks, like those that underpin cryptocurrencies, allow ownership to be distributed via tokens, which are earned for contributions to the network and which often confer governance rights. As shown in the study, an analysis of the market features and the legal aspects is propaedeutic to the appraisal of the NFT that ultimately depends on the value of its underlying asset, amplified by the NFT features.

Appendix 1 – NTF examples

- Cryptokitties.
- Cryptopunks.
- Twitter CEO, by Jack Dorsey, - NFT of his first tweet published on March 21, 2006, sold for 1,630.58 Ether.
- NFT of the Ultraviolet album by well-known DJ 3 LAU to commemorate the third anniversary of the first album sold for a record \$ 11.6 million in NFT.
- Mike Winkelmann (aka Beeple) sold NFT “Everyday: The First 5000Days” for \$ 69 million through auction house Christie’s.
- The Uffizi Galleries made the NFT of Michelangelo’s “Tondo Doni”.
- Tennis player Oleksandra Oliynykova tokenized a six-inch portion of her skin between her elbow and right shoulder for advertising purposes. NFT, originally sold for three Ether, will allow the buyer to “tattoo” on this “advertising space” a logo or message that will be picked up by the cameras every time the tennis player goes to serve.
- Sophia sold the first NFT job created by artificial intelligence on the Nifty Gateway online platform. Sophia is a humanoid robot created by Hong Kong-based Hanson Robotics.
- Dolce & Gabbana have launched the first NFT collection called Genesi

²⁴ *The World Ahead 2022 Li Jin on the future of the creator economy. Shared ownership and control of online platforms is the way forward*, in *Economist*, 8 November 2021.

- Gucci has put up for sale its first NFT inspired by the Gucci Aria movie.
- NBA has its collection of NFTs on top shots.
- Pizza Hut every week offers a new NFT linked to the pizza-themed image to be purchased on Rarible in ETH.
- Pringles has already sold 50 CryptoCrisp “flavor of NFT” virtual tubes.
- 6 pieces ‘Teo KayKay x TopChampagne Prelude Titanium’ is the first collection of customized Champagne in the world to have also combined a collectible digital work (NFT) that portrays the physical bottle and whose authenticity is certified through the blockchain.