The treachery of images: non-fungible tokens and copyright


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The treachery of images: non-fungible tokens and copyright

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1. Introduction

In April 2021, a sketch by celebrated neo-expressionist artist Jean-Michel Basquiat drew considerable press coverage due to a potential copyright dispute. Basquiat, who passed away in 1988, is well known for his use of thematic juxtapositions but is also remembered as an artist who died in his prime in tragic circumstances. His artwork is critically acclaimed, and it often sells for considerable amounts of money; a painting called *Untitled* sold for over $110 million USD in 2017, making it one of the most expensive art sales in art history.

Daystorm is an art collective that owned the Basquiat mixed media work called *Free Comb with Pagoda*, and they announced that they would be making a non-fungible token (NFT) of the work. NFTs are the latest hype in the art world: they bring together smart contracts and blockchain technology. This would not have generated much interest if it were not for the fact that their announcement included the statement that the NFT would transfer not only the ownership of the digital file, but the new owner would be given the choice to destroy the original work if they so desired.

This drew the ire of art enthusiasts and prompted several legal questions as to whether this would be possible under copyright law. There is something distasteful in the destruction of a physical work of an important 20th-century African-American artist, but also there was the fact that this was done to generate interest and scarcity in a ploy to boost the price of the

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to tackle these, and the approach will be to view NFTs from various perspectives. It is not the remit of the work to analyse the legal issues discussed. In some instances, the public perception will be dealt with as well, as it has become evident that there is considerable misunderstanding not only about what an NFT really is but also about the ownership and copyright issues that surround the technology. While NFTs are not entirely related to copyright, and in some way they are trying to bypass legal transactions in favour of technical solutions, this contribution will concentrate on the copyright questions, also will tackle some of the emerging issues about the technology.

A quick note about balance. This work will take a generally neutral approach to the study of NFTs, but this is a subject that is not devoid of controversy. There have been concerns raised about the viability of this model from various perspectives. It is not the remit of the work to tackle these, and the approach will be to view NFTs at face value. The concerns range from the environmental cost of running blockchain technology, to the use of tokens for money laundering, to the existence of often crippling transaction fees that could make it difficult for artists to profit from their work. It is important to highlight these here, although they will not be the subject of further analysis.

2. Understanding NFTs

Any discussion of NFTs must contend with the considerable amount of hype and hyperbole which accompanies the subject of cryptocurrencies, smart contracts and blockchains (also known as distributed ledger technologies (DLTs)). It is not the objective of this work to discuss these subjects in detail, as by now there is a very good understanding in the literature of what is a blockchain and how it can be used in different areas related to copyright specifically. However, as it will become clear later, NFTs require a detailed technical explanation because the legal analysis may depend entirely on what the technology is doing. There are also different types of NFT, so we need to have a clear explanation of what the technology is and how it works.

So what is an NFT? We first need to discuss tokens and DLTs, albeit briefly, as it will be assumed that this is a well-trodden topic. A blockchain is a cryptographic distributed and decentralized ledger, which keeps permanent and public record of transactions by appending information in an immutable record. The basic technology supporting DLTs is non-proprietary, which means that anyone can create and run their own network, or

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6 Ibid.


9 Blockchain mining uses proof of work technology that is energy-intensive. At the time of writing, the Bitcoin network alone required more energy than the entire country of Finland. Available at https://cbeci.org/cbeci/comparisons (accessed 3 October 2006).


they can join an existing one. Therefore, there are various blockchains out there supported by a network of computers that are used to record the transactions. We will be mostly talking about the Ethereum blockchain as it is the most popular when it comes to NFTs, but there are many others.\textsuperscript{15}

One of the most heralded uses of DLTs is that of the tokenization of assets, where a token is a programmable digital unit of value that is recorded on the blockchain. There are various types of tokens,\textsuperscript{16} and they can represent anything: commodities, loyalty points, shares, coins, etc. At the most basic level, a token in the DLT sense is a piece of code, which acts as an encryptable representation of the other object, and this code can be unique.

The most popular token standard is found in the Ethereum infrastructure that uses its own computer language called Solidity, with the deployment of tokens using a specific type of standard known as ERC20.\textsuperscript{17} The latter sets out the rules for fungible tokens. Fungible goods are by definition exchangeable; it does not matter what specific item you are selling or buying. Commodities tend to be fungible, such as silver, gold, oil and grains. Conversely, non-fungible goods are those that are unique, so a specific silver necklace, or a golden statuette or a painting. Non-fungible goods use a different token standard, known as ERC-721.\textsuperscript{18} There are many other standards that could be relevant to copyright, such as a token standard for ownership transfer (ERC-173).\textsuperscript{19} This said, for the most part, we will be discussing tokens created with ERC-721.

Any digital work is capable of being turned into an NFT, even physical goods that can be represented in some digital form, such as a photo, a video or a scan. The first use of the NFT standard in the Ethereum environment is a set of pixelated images of characters called Cryptopunks,\textsuperscript{20} which was released in June 2017. A similar type of NFT was released in October 2017, and it involved tokens representing a collectible cat game called CryptoKitties.\textsuperscript{21} In the intervening time, other types of works have been turned into an NFT, including memes,\textsuperscript{22} music albums,\textsuperscript{23} viral videos,\textsuperscript{24} sport highlights,\textsuperscript{25} tweets\textsuperscript{26} and digital art.\textsuperscript{27}

As it will be expanded later, there are various types of NFTs, but the most common is a metadata file that contains information that has been encoded with a digital version of the work that is being tokenized. It is important to explain the tokenization step in detail, as it is one of the most misunderstood parts of the NFT phenomenon. This will be vital for the legal analysis in later sections.

To illustrate the point, we will make an NFT (known as ‘minting’) of this image (Fig. 1).

There are many ways in which one can mint this picture. Assuming that we have the technical inclination and knowledge, the complicated way of turning this into an NFT would be to install an implementation of the ERC721 contract in our own computer or to use minting tools designed to help people do just that. Any digital file can be turned into an NFT in this manner.\textsuperscript{28} One then can use the file to compile a contract that produces metadata that can be written to the Ethereum blockchain.\textsuperscript{29} This metadata is using standards that are publicly verified and verifiable, so other intermediaries can just look at the data and see that this is a valid NFT. Because this metadata was

\begin{figure}
\centering
\includegraphics[width=\textwidth]{mintage.png}
\caption{Minting a picture.}
\end{figure}

\textsuperscript{17} Available at https://ethereum.org/en/developers/docs/standards/tokens/erc-20/ (accessed 3 October 2006).
\textsuperscript{18} Available at https://eips.ethereum.org/EIPS/eip-721 (accessed 3 October 2006).
\textsuperscript{19} Available at https://eips.ethereum.org/EIPS/eip-173 (accessed 3 October 2006).
\textsuperscript{20} Available at https://www.larvalabs.com/cryptopunks (accessed 3 October 2006).
\textsuperscript{21} Available at https://www.cryptokitties.co/ (accessed 3 October 2006).
\textsuperscript{22} Available at https://foundation.app/@DisasterGirl/disaster-girl-25046 (accessed 3 October 2006).
\textsuperscript{23} Available at https://opensea.io/assets/0x557430421f8f3ed0a92aca21f11c65ad7b668288/0 (accessed 3 October 2006).
\textsuperscript{24} Available at https://shorturl.at/ByTW9 (accessed 3 October 2006).
\textsuperscript{25} Available at https://nhapotiphon.com/ (accessed 3 October 2006).
\textsuperscript{26} Available at https://v.ccent.co/tweet20 (accessed 3 October 2006).
\textsuperscript{27} Available at https://onlineonly.christies.com/s/breple-first-5000days/lots/2020 (accessed 3 October 2006).
\textsuperscript{28} For example, using a tool called Minty that allows the user to turn any digital file into an NFT: https://bit.ly/3iyRUhj/ (accessed 3 October 2006).
\textsuperscript{29} Instructions on how to do this locally can be found here: A Coathup, ‘Create an NFT and Deploy to a Public Testnet, Using Truffle’ (OpenZeppelin Blog, 1 March 2021). Available at https://bit.ly/3RQjmFy (accessed 3 October 2006).
encoded with a file and a set of private keys and private accounts, the resulting token is unique and intrinsically encoded with the original file.

The resulting NFT is a piece of code that is written into the blockchain that contains various bits of information. The ERC-721 standard contains elements that must be present and some that are optional. The first core element to the NFT is a number known as the `tokenId`, which is generated upon the creation of the token; the second is the `contract address`, this is a blockchain address that can be viewed everywhere in the world using a blockchain scanner.  

The combination of elements contained in the token makes it unique: there can only be one token in the world with the combination of `tokenId` and `contract address`. At its very core, the NFT is those two numbers.  

There are other important elements that can be present in the contract. One is the wallet address of the creator, which helps identify the work with its originator. Another element common in most NFTs is the inclusion of a link to where the original work can be found: this is because the NFT is not the work itself. Other NFTs include hashes of the images used to create it, or in the case of Cryptopunks, a hash of every other Cryptopunk.

In this context, minting a work as an NFT means that a creator uses a digital work to generate a unique number that is then written into the blockchain in the shape of a smart contract using the ERC-721 standard, and this is done using a unique digital signature that belongs only to the person minting it. In principle, this is what gives the NFT its ‘scarcity’ value: it is supposed to be unique. In reality, anyone can mint as many versions of the same work as they wish.

While one can do all the hard work and mint the work oneself using smart contracts and compiling the file locally, this requires some considerable technical knowledge. As a result, most NFTs are minted using a platform or intermediary.

There are dozens of NFT marketplaces that offer the service of minting an image, a process that can take little time. One does still need to have an Ethereum wallet address to digitally sign the file, and, in some instances, one also needs funds to pay for the transaction. This is because writing information into the blockchain requires funds to generate empty transactions that will represent the contract’s data. The transaction cost varies depending on offer and demand, and it is called gas.

We are going to mint the above picture using an intermediary—in this case Mintable, which offers a gasless service. The first step is to upload the image to the service, and then one must have an Ethereum wallet—in this case, we are using MetaMask.

As it can be seen above, the NFT is not the work itself: it is the metadata file that contains the unique combination of `tokenId` and `contract address`. It is important to point out that the resulting NFT can contain other information such as the name of the work, the name of the author, the copyright status of the work, and as many other details as one feels like

30 Available at https://etherscan.io/ (accessed 3 October 2006).
32 Take Beeple’s First 5000 Days, which has a unique `tokenId`, a smart contract address and the wallet address of the creator: 0x6b0562605D35eE710138402B878f6ef6F2E23807.
33 A hash is a number (usually using hexadecimal notation) that has been generated using an input of any arbitrary length. Because the number is the direct result of the input, it is unique. See M Bellare et al., ‘Keying Hash Functions for Message Authentication’ in Neal Koblitz (ed) Advances in Cryptology (Springer 1996) 34.
34 The contract can be found here: https://github.com/larvalabs/cryptopunks/blob/master/contracts/CryptoPunksMarket.sol#L5 (accessed 3 October 2006).
36 Mintable, OpenSea, Rarible, Foundatio, SuperRare, and NiftyGateway, just to name some of the most popular at the time of writing.
37 See an example of a wallet here: https://etherscan.io/address/0x0C8B990C08c37f20547B75eF6b1b7ED8b8c97bb98 (accessed 3 October 2006).
38 Available at https://mintable.app (accessed 3 October 2006).
39 Available at https://metamask.io/ (accessed 3 October 2006).
40 Available at https://mintable.app/art/item/A-day-in-the-life-Copyright-article-experiments/Zs_7_5nxVXcW (accessed 3 October 2006).
41 Available at https://metamask.io/art/item/A-day-in-the-life-Copyright-article-experiments/Zs_7_5nxVXcW (accessed 3 October 2006).
42 56742968571651567842470476732289835256898763642165777827
43 2901276532434600339.
44 0xc6b0562605D35eE710138402B878f6ef6F2E23807.
45 0x8c5aCF6dBD24c666FD44d4A4C3d7a2D9555AAad2 (accessed 3 October 2006).
including. The tokenID and the contract address are the most important elements, as they are linked specifically to both the original work and the signature used to generate the token.

It must be stressed that the actual image is not the NFT, and it is not a part of the NFT other than by the presence of a URL that directs to the image. This will be discussed further in what follows. For now, let’s stress the fact that, while the image was used to encode the NFT and make it uniquely attached to the image, the NFT is not the actual image itself, it is the metadata that ties it to the original file.

When someone is purchasing an NFT, they are purchasing the metadata file and, as an NFT, this is transferrable as well. Some people have therefore compared NFTs to a signed copy of a work. This is somewhat inaccurate as the NFT is not a copy itself: instead, it is more like a signed receipt of a work, where the ownership is not of the work itself, but ownership of the receipt.

There is another type of NFT where the work is uploaded in its entirety to the blockchain. These are truly blockchain native works and are often referred to as on-chain works. They can only be exchanged and transferred with other people on the blockchain, so the NFT acts more like true ownership of the work. There are not many projects that upload the full work to the blockchain in this manner.\(^{43}\) The reason for this is that the cost of writing data into the blockchain is prohibitively expensive, and this is so by design. In Ethereum, the cost of uploading a kilobyte of data is set at 640,000 gas.\(^{45}\) The

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43 An example that uploads the entire image on-chain is Avastars. Available at https://avastars.io/ (accessed 3 October 2006).
cost of gas changes from day to day, at the time of writing this would amount roughly to USD 15.15/kB. However, the cost in gas goes up by design precisely to dissuade users from clogging up the network with useless data: the more you upload, the more it costs to upload it. While the cost of 1 kB is 640 000 gas, the cost of uploading 1 MB is 655 million gas. Things become more complicated because there are different types of storage on the blockchain, with high speed of transaction and high gas price. Palau calculates that uploading 1 MB of data could be as high as 32 ETH (USD 71 410 at the time of writing). Given the costs, there is little use in using the blockchain to store data, which is the main reason why NFTs consist of small metadata files. The image itself can be stored by a platform. It can also be stored online using a file storage service and even a blockchain-friendly distributed filing system called an Interplanetary File System (IPFS).

### 3. NFTs as digital rights management

Reading the above description of NFTs from a technical perspective, one could be forgiven for not thinking about copyright at all. For the most part, an NFT is a metadata file that has been encoded using a work that may or may not be subject to copyright protection. It could even be a work on the public domain, as will be discussed later.

As explained above, anything that is subject to being digitized can be turned into an NFT, but the original work is only needed in the first step of the process, namely the creation of a unique combination of a tokenID and contract address. So, in principle, there is very little interaction with copyright. However, there is growing misunderstanding when it comes to the ownership of an NFT and what exactly it represents. There is an increasing amount of popular press coverage of the NFT phenomenon, mostly fuelled by hype and stories of works being sold as an NFT. The problem rests in the very reporting of these sales, which seem to assume that what is being sold is the work itself and not a digital representation of the work. Take for example the story of Jack Dorsey’s first tweet. Dorsey is the Twitter CEO and a big proponent of cryptocurrencies. In March 2021, he sold an NFT of his very first tweet in a marketplace called Cent, which specializes in these tokens. The technology sections of several news websites reported the same story as if the tweet had been sold and not a token of the tweet: ‘Jack Dorsey’s first ever tweet sells for $2.9 m’ said the BBC. Many other publications went with similar headlines, giving the impression that the actual tweet had been sold. The news, and the accompanying perception, is inaccurate: the tweet did not sell because it was never for sale. What was sold was not the actual tweet but rather an NFT of it.

The problem is partly linked to the prices that are being paid for these tokens. An NFT of Pixel, a picture of a grey square by digital artist Pak, sold for USD 1.3 million at auction, while an NFT of a virtual plot of land in the game Axie Infinity was sold for USD 1.5 million. It seems difficult to believe that all these buyers are spending such amount of money for what amounts to a short metadata file and a string of numbers and letters of dubious artistic value, but in fact, this is what most NFTs actually are. This is so despite the recognition of most sellers that no copyright is being transferred. As a result, most popular NFTs such as Cryptokitties and Cryptopunks do not involve copyright transactions.

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46 This was calculated using the Ethereum Gas price calculator at [https://ethgasstation.info](https://ethgasstation.info) (accessed 3 October 2006). Gas has its own cost unit, called the Gwei, which also changes depending on demand. At an average price of 10 Gwei, the total cost in Ethereum is 0.006784 ETH, and the price of ETH is 1 ETH = USD 2,233.53, which produces an average cost of USD 15.15/kB.


48 Ibid.

49 Available at [https://ipfs.io](https://ipfs.io) (accessed 3 October 2006).

50 Take, for example, this NFT owner who manages to completely misunderstand the nature of the asset: [https://twitter.com/RookieXBT/status/1421548360808286464](https://twitter.com/RookieXBT/status/1421548360808286464) (accessed 3 October 2006).

51 Available at [https://v.coint.co/](https://v.coint.co/) (accessed 3 October 2006).


55 The NFT smart contract can be found here: [https://etherscan.io/address/0xc7cc3e8c6b69dc272ccf64cbff4b7503cbf7c1c5](https://etherscan.io/address/0xc7cc3e8c6b69dc272ccf64cbff4b7503cbf7c1c5) (accessed 3 October 2006).

56 Available at [https://twitter.com/seedphrase/status/1358918272767324160](https://twitter.com/seedphrase/status/1358918272767324160) (accessed 3 October 2006).


3.1 Assignment

There are several copyright elements in some NFTs. There are situations in which a work may be minted without the author’s permission, prompting questions of copyright infringement, which will be dealt with later.

While most NFTs do not involve a transfer of rights, there are a few instances in which the seller offers to turn the token into an actual transfer of copyright ownership in the original. Some platforms offer to build in copyright elements into the sale, such as copyright transfers. Mintable, for example, includes a tick-box that allows the person minting a work to 'Transfer Copyright', and this is included in the final smart contract (see Fig. 3). A few platforms are even being built with copyright transfer in mind: Hup Life is an NFT marketplace that builds into their contracts a 'Berne compliant' copyright transfer of rights.

The first question to ask is whether such a minimalistic form could act as a valid transfer of rights. The 'enjoyment and exercise' of copyright is devoid of formalities in accordance with Art 5(2) of the Berne Convention. This means that the subsistence of copyright does not rest on the compliance with formal requirements: rights will exist if the work meets the requirements for protection set out by national law and treaties. While there is no constitutive formal requirement, some jurisdictions provide for some sort of formality with regard to the alienation of those rights. As there is no harmonization on the extent of those formalities, it is a matter for each jurisdiction to set out what the requirements will be.

With regard to the transfer of copyright, the UK Copyright Designs and Patents Act (CDPA) requires a copyright assignment that is 'in writing signed by or on behalf of the assignor'. In the widest sense, an assignment of copyright means that the ownership of a work will be transferred to the assignee. The copyright assignment can be for all of the ownership but also can be broken down into different rights, for example, the author can assign rights to an exclusive right of the author or can even assign to a specific territory. Therefore, a written requirement is of particular importance as it can specify the type and length of rights assigned.

But what does 'in writing' and 'signed' mean exactly? It is accepted widely that electronic documents can be used to conduct contracts and, while a copyright assignment is not necessarily a contract as such, the relevant interpretation and case law with regard to written and signature requirements can elucidate what can be considered a valid assignment. Similarly, it is also widely accepted that whenever there are written requirements in law, these can be fulfilled by a wide range of technologies as the definition of what is 'written' is to be interpreted broadly so to encompass 'typing, printing, lithography, photography and other modes of representing or reproducing words in a visible form'. Over the years, the definition of what is 'written' has been interpreted widely to accommodate various types of formats, from an electronic personal organizer to an email.

As regards copyright assignment, the definition of what is

59 As evidence of this, we opened the first 12 NFT sales in the marketplaces OpenSea, Rarible and Mintable on 4 July 2021, and none of the sales involved a copyright transfer. See the list of works here: https://docs.google.com/document/d/1NHkNz0m1TrHc1xtV5VxeoPmOy8-wNhMrKaej99dRg/edit?usp=sharing (accessed 3 October 2021).
60 Available at https://www.hup.life/ (accessed 3 October 2006).
61 Berne Convention for the Protection of Literary and Artistic Works 1886.

63 Copyright Designs and Patents Act 1988 s90(3).
64 Ibid.
66 Ibid.
68 Schedule 1 of the Interpretation Act 1978.
69 Rollo v HMA 1997 JC 23.
70 Immingham Storage Co Ltd v Clear plc [2011] EWCA Civ 89.
a written document has also been broad in its interpretation: even a receipt has been deemed to be enough to fulfill this requirement. Even if the assignment can be minimal and in electronic format, it still needs to clearly identify the work. This could prove to be slightly more difficult to evidence in some NFTs, as the assignment is performed in computer code.

As to the signature requirement, the law here is also generally welcome to the use of electronic signatures whenever there is such a requirement. The law governing electronic signatures in the UK is the eIDAS Regulation, which defines an electronic signature as ‘data in electronic form which is attached to or logically associated with other data in electronic form, and which is used by the signatory to sign’. Similarly, Art 25.1 of the Regulation clearly states that an electronic signature ‘shall not be denied legal effect and admissibility as evidence in legal proceedings solely on the grounds that it is in an electronic form’. What this means in practical terms is a wide range of types of signatures being accepted as valid by the courts. For example, an email can be a valid signature if it shows the intention of it being a signature, as well as containing the name of the signatory party.

While existing rules are broad and inclusive to various electronic formats, it is not yet clear if they could include the type of cryptographic signature that is used to sign an NFT. As described in the previous section, an NFT is created using a unique signature that the person minting the token can set up; the signature is a cryptographic key that only the owner has access to. The Law Commission of England and Wales has been favourable in its wide interpretation of what is considered a signature, allowing not only for a wide range of physical signatures but also for various electronic formats. There has also been a recent consultation by the UK Jurisdiction Taskforce looking specifically at cryptographic assets such as tokens, and they believe that there is no reason to believe that private-key signatures would not be classed as electronic signatures for any legal purpose. Also in situations where a document has been signed using proprietary tools, this could be a digital signature. While this does not mention wallets specifically, it is implied in the definition.

With regard to the use of a tick box to generate a copyright assignment, this could be akin to what is known as a click-wrap agreement, namely legal documents that are usually entered into by the click of a button. This is a widely accepted practice, and there is substantial case law accepting the use of ‘I Agree’ click buttons and even tick boxes. It would appear that, as long as it is clear that the party is willing to make a copyright assignment according to what they ‘say and do’, the ticking of a box, the filling of a form and the signing of a token electronically could all be taken together to evidence the existence of an assignment.

With all of that in mind, there could still be a little bit of doubt as to whether a token written in code could meet the written requirements. While opinion is divided regarding the formal validity of smart contracts as contracts, there is growing recognition that these could act as valid forms of rights transfers. This said, authors may want greater reassurance than a potentially tenuous legal analysis, so there could be other options that bypass the technical aspect. An author can use an NFT to transfer ownership of a digital asset electronically, and also write a document in natural language and with a physical signature to ensure the buyer that there has been a proper transfer of rights. This is the preferred solution of some platforms that are offering copyright transfer as part of their services. The platform Hup Life is planning to include what they call a ‘second layer NFT’ that will comply with copyright formalities in order to ‘transfer a full bundle of rights’.

### 3.2 Registration

Besides copyright assignment, could an NFT be used in other types of digital rights management? Smart contracts in general have been heralded at some point...
as potential copyright management tools, including licensing, micropayments and registration, just to name a few. Some platforms are also suggesting the use of NFTs specifically in the management of rights. Collectible NFT revolution fully, listing some of the most successful and valued NFTs, such as Beeple’s First 5000 Days and Sir Tim Berner’s Lee’s WWW code. Christie’s is not a register, but a listing there acts as a seal of quality and provenance. There is then a lower tier of platforms that also offer more exclusive tokens, such as Nifty Gateway and Foundation, which also specialize in celebrity drops and high-end tokens. Next down are other less exclusive platforms such as Rarible and OpenSea, with a bottom pile of other platforms such as Mintable and Cent with very little user verification.

There is another advantage in using a platform that has some sort of verification mechanism, and it is that it may be possible for hackers to seemingly replicate an NFT, even making it look like it came from an address. This is what is known as ‘sleepminting’, in which a third party can mint a work without authorization making it appear as if it came from the author.

3.3 Licensing

What about licences? In theory, it is possible to code into a smart contract any type of agreement. If we take a licence to be a legal document that allows a user to perform an action otherwise restricted by copyright, then this can be achieved as well with an NFT. This said, a survey of the major NFT platforms at the time of writing did not produce any cryptographic smart contract licence in the shape of an NFT. This does not mean that such a

83 Cent, ‘Valuables FAQ’ (2021). Available at https://docs.google.com/document/d/1kBx-HXYiow_7bElsaZ6sk3r2v9cQjSr/dWfyKCUxZ/La/edit (accessed 3 October 2006).
84 Digital artist Corbin Ranbolt is just one of the many artists complaining about NFTs that have been created without their permission. Available at https://twitter.com/CorbinRainbolt/status/1369433485086195717 (accessed 3 October 2006).
85 Take this digital design of a famous photograph of Elon Musk smoking during Joe Rogan’s podcast:
86 Available at https://minter.app/Collectibles/items/Black-15-Among-Us/8i9qW0ReTEDFmT (accessed 3 October 2006).
87 Another example is a man who made a copyright claim for the Mona Lisa. Available at https://verisart.com/works/23f2c64a-08c6-4a42-8013-84ac8422df/ (accessed 3 October 2006).
88 See, for example, UREEQA, a platform that claims to conduct ‘ownership, authorship & originality’ checks in the creation of an NFT. Available at https://www.ureeqa.com/ (accessed 3 October 2006).
89 A hacker using the alias Monsieur Personne successfully minted a replica of Beeple’s The First 5000 Days. Available at https://nftheft.com/ (accessed 3 October 2006).
The NFT community has been finding out that a token is not ownership of rights and does not confer a licence automatically.94

### 3.4 Royalties

The other main use of an NFT is when trying to obtain royalties for a work. This is an area where the technology is really having a positive effect for artists. While we can argue that the use of NFTs for copyright assignment and licensing is limited, the built-in payment capability of the smart contract allows authors to receive immediate payment for their work, even when what is being sold is mostly a database entry. Regardless of what one may think of the cryptocurrency market and the long-term feasibility of the token market, there is little doubt that people are buying NFTs at exorbitant prices, and this is benefitting those content creators that are able to take advantage of the hype.

When an author mints and sells a token at an auction platform, the buyer will have funds in a cryptocurrency wallet, most likely Ether; the highest bidder will transfer funds to the seller; the asset will then be transferred from the seller’s wallet to the buyer’s, where it will reside until it is transferred again. Here is where the smart contract can shine in different ways.

To exemplify, French musician Jacques released a song called ‘Vous’ and created one NFT for each second of the song (191 in total).95 Fans can thus purchase a token that represents a second of the song. The interesting part of this experiment is that Jacques claims that this is actual share from the profits of the song, so there will be 191 co-owners of the piece, each receiving shares from the royalties obtained from it from any source, and this will be paid directly to the NFT’s owner wallet (0.51 per cent of the royalties for each token). While the NFT is not a transfer of rights itself, the buyer of each second purchases rights to the song, as well as other perks such as a signed limited-edition vinyl, and a signed visual contract of the actual transfer of rights. At the time of writing, each second was selling for just under a thousand USD (0.48 ETH), and almost all seconds had been sold, giving the author a profit of over USD 150k. It is not clear if the song will make enough in royalties to make it worthwhile for each buyer, but it is still an interesting experiment in community building using NFTs.

Another way in which NFTs can act in the collection of royalties is in the inclusion of an automated resale clause in the smart contract. Some platforms allow creators to specify a resale percentage. For each further sale of the

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90 Another example is a documentary that is offered as an NFT with an additional licence to use the clip for 15 years; see https://bit.ly/3gyMtsf (accessed 3 October 2006).


93 See: https://www.nftlicense.org/ (accessed 3 October 2006).

94 See this interesting discussion thread: https://twitter.com/spence coin/status/1414357068996454018 (accessed 3 October 2006).

95 Available at https://jacques.live/nft (accessed 3 October 2006).
token, the creator will receive a specific percentage of that further transaction. Rarible, for example, marks this as ‘royalty’ and sets the percentage maximum of 50 per cent but recommends between 0 and 10 per cent. In some way, this setting is a technical a hard-coded droit de suite where artists would obtain automated proceeds for each further transaction of the token. It is not difficult to see how this system is appealing to authors as it guarantees future earnings in a manner that the law cannot. Furthermore, when we consider that for the most part the author would also retain full copyright even after selling the NFT, this benefits them considerably. Contrast this with the existing resale right in the UK as implemented by the Artist Resale Rights Regulations 2006 (ARRR), which is very limited in scope and application.97 The resale right applies only to works that have been purchased from an intermediary that exceed EUR 10,000, and the royalty is calculated on the basis of the amount of the resale on a sliding scale, where a work sold for a price of up to EUR 50,000 would get a 4 per cent royalty, while a work sold in excess of EUR 500,000 would get 0.25 per cent. The royalties are also capped at EUR 12,500 per sale.

The advantage of the author choosing the NFT route is immediately evident: an artist that sells an NFT and sets the resale royalty at 10 per cent will always recover that amount after each resale. Furthermore, this is not subject to the exceptions of the ARRR and is also paid directly to their wallet on the completion of each transaction.

From the perspective of the artist, we are just starting to explore the various possible uses of the technology, with many other platforms being created with royalties and digital rights management in mind. The only question is whether the market can maintain the current hype cycle. This is yet to be answered. There is evidence that early 2021 was part of a wider cryptocurrency bubble, and, at least at the time of writing, the market has been slowing down in both the number of sales and the volume of offerings.98 Buyers may be wising up to the fact that what they get when they purchase an NFT is not the actual work, but rather a digitally signed ledger entry of a work.

For the time being, artists are using the popularity of NFTs to enhance their drops with extras and other items, for example, sending a physical copy of the artwork to the buyer of the digital token.99 Some come with a subscription to a magazine100 or with a subscription to a community of owners.101

4. Copyright infringement and NFTs

4.1 Potential for infringement

While the digital rights management aspect might prove to be an important part of the tokenization scene, the potential for copyright infringement could have a more immediate effect on the development of NFTs. Given the hype that exists about the technology, as well as the prices that are being paid for NFTs, there is considerable scope for legal action in this area.

This is not just idle speculation, and we are already seeing a few instances of possible copyright infringement taking place, and even a cursory look at marketplaces produces many different infringing listings.102 First, there was the Basquiat drawing mentioned in Section 1. Then, some artists started complaining on social media that their works were being minted into NFTs without their permission,103 and there was even an instance of works in the public domain from the Rijkmuseum in Amsterdam that were turned into an NFT.104 Entire collections are being propped up filled with infringing works.105 Most of these instances of potential infringement were solved outside of court, usually through the removal of the token from the auction platform.

The first legal action involving copyright infringement is currently underway in the USA and involves hip-hop artist Jay-Z. In 1996, Jay-Z released his debut album Reasonable Doubt with the label Roc-A-Fella (RAF), which was cofounded by producer Damon Dash. The producer is now only a minority shareholder with RAF, but in June 2021, he announced that he would be listing an NFT of

96 This was expanded to the full duration of copyright in the Artist’s Resale Right (Amendment) Regulations 2011.
99 An example here: https://rarible.com/token/0x60f80121c31a0d46b52797009df7860544a5e5e11111629 (accessed 3 October 2006).
100 Available at https://rarible.com/token/0x4813c06eb9919db20634c43156d6bf8d35501fe10016f6f5f=owners (accessed 3 October 2006).
101 For example, the Bored Ape Yacht Club: https://boredapewayachtclub.com/ (accessed 3 October 2006).
102 Found this copy of Mickey Mouse in a few seconds: https://opensea.io/assets/0x495f947276749ec64668aca9c248420045cb55e898849685423103256372658413712832655606595321012682519336070810111867617281 (accessed 3 October 2006).
103 One example here: https://twitter.com/WeirdUndead/status/1369210982518693888 (accessed 3 October 2006).
105 See https://mintable.app/u/samklnft (accessed 3 October 2006).
Reasonable Doubt with the collectible platform Super-Farm (the listing has since then been removed).\textsuperscript{106} RAF is the copyright holder in the album, so they immediately sued Dash claiming copyright infringement.\textsuperscript{107} A judge issued a temporary restraining order stopping the sale,\textsuperscript{108} and the case is ongoing at the time of writing.

While it is difficult to analyse this case at such an early stage, there is no doubt that it raises several questions, particularly whether there is even copyright infringement involved in the minting of a work. This could appear to be an easy question to answer: clearly, there must be some form of copyright infringement in the minting of an NFT without permission, that is, until we really try to analyse what an NFT is, and how it is generated. It is then those doubts start to surface. If an NFT is mostly metadata of a work, is it really infringing to generate that code and write it to the blockchain?

Here is where having a precise understanding of the technical characteristics of what is an NFT becomes relevant. As we have seen, most NFTs are a code file that has been generated with a digital work. As explained in Section 2, one takes a digital file and then uses it to produce two core components of this file, a uniqueID and a blockchain address. The code itself acts as a smart contract that exists in the blockchain as well. But this code often has other information. The most common element that is included is a URL to the work itself.

From a copyright perspective, it is difficult to see how the minting of an NFT, even without authorization, could be considered copyright infringement. As the NFT is not the work, but rather a string of numbers that have been generated with a work, the resulting file could not be considered a reproduction of the work or even an adaptation. At most we could be looking at some form of communication to the public. We will get to that later.

4.2 Copyright infringement

For there to be infringement, there are three requirements that must be met: (i) the infringer (undertook one of the exclusive rights of the author without authorization; (ii) there is a causal connection between both works and (iii) the entirety of the work, or a substantial part of it, has been copied.\textsuperscript{109}

We will tackle these out of sequence for reasons of complexity. Looking at whether there is a causal connection between the works, we can admit that a token is derived from an original work in a technical manner: one needs to have access to a digital version of the work to make an NFT. As a result, we can probably establish that connection. Over the years, the question of a work being derived from another has been factual, and even though two works could be similar, there may not be a connection between one and the other, as they may have been created independently.\textsuperscript{110} Conversely, there is no doubt that in the case of a token, the connection is there.

Going to the question of whether a work has been copied in its entirety or in a substantial manner, the answer will depend on the type of NFT. If the NFT is on-chain and therefore fully uploaded to the blockchain, then undoubtedly there is direct copying of the work, and it could be considered prima facie copyright infringement. However, as it has been mentioned, this is rarely the case because of the prohibitive cost of doing so. As most NFTs are code-only tokens, it is evident that there is no substantial copying of the work, as the token is just code that does not represent the work at all: it is just code that was generated with the work. It is important to stress that, while the actual NFT is just code, there could be a listing on a website with infringing material. We will go into that later.

Leaving the first element for last, as it is more complex, can we consider an unauthorized minting of a work as an activity that falls under the exclusive rights of the owner? Broadly speaking, the exclusive rights of the author are the rights of reproduction, publication, lending and rental, public performance, adaptation, communication to the public and authorization to perform any of the above.\textsuperscript{111} Not all of these apply to NFTs; we will focus on reproduction, adaptation and communication to the public.

First, let us look at potential reproduction in the minting of the work itself. As it has been mentioned above, this is an easy answer if the work is on-chain. But this is not common, most NFTs are encoded using an existing work, this is to ensure the uniqueness and provenance of the work, even though one can generate various ‘unique’ versions of the same work, much like limited edition lithographs. For now, let us assume that we are producing only one token from one work. We need a copy of the work to perform the minting, which is done by digitally


\textsuperscript{107} The text of the complaint can be found here: https://bit.ly/2URaZSE (accessed 3 October 2020).


\textsuperscript{109} Bently et al. (n 65) 194.

\textsuperscript{110} Some cases where this is the case: John Kaldor Fabricmaker UK Ltd v Lee Ann Fashions Ltd [2014] EWHC 3779 (IPEC); and Francis Day & Hunter v Brown [1963] Ch 587.

\textsuperscript{111} CDPA ss16-21.
signing the token with a wallet using the original. Once that has been completed, we do not need the digital work at all: the NFT exists independent of that file. It would be possible for this digital version of the work to be lawfully acquired, for example, it could be a purchased digital copy of a song, or one could use an image that has been shared online under the terms of a some-rights-reserved licence such as Creative Commons.112 Once minted, there is no need to make an unlawful sharing of the work.

It would also be possible for the person minting the work to do so using an unauthorized copy, such as a downloaded version of the work without permission, even by generating the unauthorized copy by taking a photograph of a painting at a museum, recording a film at a cinema or even ripping113 a song from a streaming site. This could very well be an infringing act, even if making a private copy of a work.114 Assuming, however, that the creator of the token only makes a private copy and does not link to the work in the NFT, then there is practically no connection from that potentially infringing copy to the token. The token is not a reproduction of the work in any sense of the word: there is no literal embodiment of anything resembling the original in the NFT.

Could an NFT be an adaptation then? An adaptation is defined in the CDPA in very specific terms115 and can only occur with an original work, namely literary, dramatic, musical and artistic work. The CDPA deals with adaptation in different ways depending on the subject matter. For example, an adaptation of a literary work could be making a translation of it,116 turning a literary work into pictures,117 or transferring it into a format in which the story or action is conveyed in full or in part. With regard to a dramatic work, an adaptation could be turning it into a film,118 while for a musical work, an adaptation is done by making an arrangement or a transcription of the work.119

It is difficult to see how the making of a token could fit with any of these relatively narrow definitions of adaptation: it would take a much wider interpretation to consider an NFT to be one. One could look at whether making an NFT is in some way a translation of a work into another, something akin to format-shifting.120 In most cases where there is some form of transformation of a work into another format or medium, there is often a recognizable element of the original work.121 Perhaps, the most useful case when looking at this from this perspective is Brigid Foley v Elliott,122 where the knitting of a garment following instructions from a knitting guide did not infringe copyright, as in effect a set of instructions is not an adaptation of a work. Similarly, Whitford J observed in J & S Davis v Wright that ‘you do not infringe copyright in a recipe by making a cake.’123 Contrast this with Moon v Thornber,124 where the claimants had written a set of instructions on how to make a tartan pattern, and the defendants had made their own version of the pattern by effectively reverse-engineering those written instructions into their own design. This was found to be an infringement by Judge Birss QC (as he then was) by ruling that the defendants’ pattern was an adaptation of a literary work.125 Even taking this very wide interpretation of what is potentially an adaptation, the resulting pattern is at least connected to the original one, and one can make a copy of the pattern by following the instructions. The same is not true of an NFT, where the code has no bearing to the work used to create it. One could perhaps try to make an argument that the token is an adaptation because it can be used to commercialize the work,126 but this does not appear to be remotely persuasive.

Finally, the strongest argument in favour of finding infringement in the unauthorized minting of a work

112 For more on Creative Commons, see S Corbett, ‘Creative Commons Licences, the Copyright Regime and the Online Community: Is there a Fatal Disconnect?’ (2011) 74 Modern Law Review 503.
113 Ripping is the term used for the creation of a digital copy of a streamed work, be it an audio site like Spotify or a video from YouTube. See https://en.wikipedia.org/wiki/Stream_ripping (accessed 3 October 2006).
115 For more on adaptation, see PR Gool, ‘Why the U.K. Adaptation Right is Superior to the U.S. Derivative Work Right’ (2013) 92 Nebraska Law Review 843.
116 CDPA s21(3)(a).
120 While format-shifting as such is a US concept, it may be useful to look at it in this context. For more on this, see A Dnes, ‘Should the UK Move to a Fair-Use Copyright Exception?’ (2013) 44 IIC 413–444.
121 See Interlego A.G v Tyco Industries Inc & Ors (Hong Kong) [1988] UKPC 3. While not a format-shifting case, the similarity standard is explained well in Designer Guild Limited v Russell Williams (Textiles) Limited [2001] 1 All ER 700.
124 Abraham Moon & Sons Ltd v Thornber & Ors [2012] EWPC 37.
125 Ibid 92.
126 This argument could potentially use old cases such as D’Almaine v. Boosey (1835) 160 Eng. Rep. 117 (K.B.) where an abridgement of a work was considered an infringement because its connection to the original made the adaptation more saleable.
would be to analyse whether the NFT could be a communication to the public.\textsuperscript{127} Generally speaking, the right\textsuperscript{128} allows owners to restrict actions such as posting a film on a torrent website, or streaming music without permission, just to name a few.

An unauthorized NFT could potentially be found to be a communication to the public, and again, we need to look in detail at the technical aspects of what is contained in such a token. As it has been explained, one of the elements that is very common in the creation of an NFT is that the work will link to the digital copy that was used to generate the work. This is not technically necessary, but it is common practice. This element is just a hyperlink to a cloud storage service or to a distributed IPFS service. The relevant element for the current analysis is that the work is not necessarily hosted directly by the minter or by the platform. Looking at some famous NFTs, this link is very common, take Beeple’s First 5000 Days: the token has a link to where the file can be found.\textsuperscript{129} Other famous NFTs also have links to where the original can be found, such as Nyan Cat\textsuperscript{130} and Disaster Girl.\textsuperscript{131} In fact, if you know both the smart contract blockchain address and the tokenID, then you can find the link to a work as long as it exists, either by looking at the code directly or by using a service such as CheckMyNFT.\textsuperscript{132}

It is important to stress that the link may not exist or, even if it does, the link may be broken, which is increasingly a common occurrence.\textsuperscript{133} What is relevant for the purpose of a possible communication to the public is that most NFTs do contain a link. However, this link may not be always easily accessible.\textsuperscript{134} For example, the NFT contract may not be public. In such a case, it may be difficult to even obtain a link.

So, if a person mints a token without the owner’s permission and it has no link to the work, then there is no problem. We could argue about the ethics of it, but it is difficult to see how this could be any sort of infringement. But what if the token contains a link to an infringing copy of the work? The uploading of the work itself would be a copyright infringement, but, depending on some of the technology used, it may be difficult to remove. For example, IPFS has been developed as a ‘censorship resistant’ file repository system that acts as a distributed storage of resources,\textsuperscript{135} so files are stored in different nodes, making them difficult to remove.\textsuperscript{136} So if the direct infringement files cannot be removed, then perhaps the NFT itself is a communication to the public.

A review of the case law would lead us to think that this may well be a viable legal analysis. It is accepted that posting links to an infringing file such as one hosted in a torrent website or similar is a communication to the public and can inter alia trigger the issuing of a blocking order.\textsuperscript{137} Particularly relevant is Dramatico Entertainment v BSkyB,\textsuperscript{138} where the claimants sought an order against the popular illegal file sharing website The Pirate Bay (TPB) alleging that it served links to infringing copies of their works, and therefore, it was a communication to the public. Arnold J (as he then was) found that there was indeed a communication as ‘copies of the sound recordings are made available to users who have not purchased them from an authorised source’.\textsuperscript{139} It is perfectly possible to use these cases as analogous to the link contained in an NFT, and even if it is not possible to remove the infringing copy because of the nature of IPFS storage, as it is often the case with torrent sites such as TPB. A link to an infringing copy could potentially be found to be infringing.

The CJEU\textsuperscript{140} has been grappling with the question of hyperlinks in recent years, and while navigating through some often contradictory judgments remains difficult,\textsuperscript{141} one can see a few common elements emerging.\textsuperscript{142} The problem has been that the Internet relies on hyperlinking, and a very strict reading of the right to communicate to the public could lead to a serious hampering of the ability to post anything online. So, the CJEU has been

\textsuperscript{127} CDPA s20.

\textsuperscript{128} For more on this, see C Angelopoulos, ‘Communication to The Public and Accessory Copyright Infringement’ (2017) 76 The Cambridge Law Journal 496; J Koo, The Right of Communication to the Public in EU Copyright Law (Bloomsbury Publishing 2019).

\textsuperscript{129} Available at https://ipfs.io/ipfs/0xDPvP3XVC5aU (accessed 3 October 2006).

\textsuperscript{130} Available at https://ipfs.io/ipfs/QmQ6mNE5wVWzx8jZCtGq2nWOnW1WNuxxYjcdBe5Q5myYXPN64NnTVpvW7Nfnp4 (accessed 3 October 2006).

\textsuperscript{131} Available at https://ipfs.io/ipfs/QmQ6mNE5wVWzx8jZCtGq2nWOnW1WNuxxYjcdBe5Q5myYXPN64NnTVpvW7Nfnp4 (accessed 3 October 2006).

\textsuperscript{132} Available at https://checkmynft.com/ (accessed 3 October 2006).

\textsuperscript{133} CheckMyNFT looked at the links contained in several tokens sold in the NiftyGateway platform and found several contained broken links. Available at https://twitter.com/CheckMyNFT/status/1371991050753891584 (accessed 3 October 2006).

\textsuperscript{134} Post (in March, 2020).


\textsuperscript{136} While it is not perfect, censorship resistance is part of the intended design. See a discussion here: https://discuss.ipfs.io/t/how-censorship-resistant-is-ipfs-intended-to-be/7892/4 (accessed 3 October 2006).

\textsuperscript{137} Starting with Twentieth Century Fox Film Corporation & Anor v Newzbin Ltd [2010] EWHC 608 (Ch).

\textsuperscript{138} Dramatico Entertainment Ltd & Ors v British Sky Broadcasting Ltd & Ors [2012] EWHC 1152 (Ch).

\textsuperscript{139} Ibid 70.

\textsuperscript{140} While Brexit has happened, there is now clear guidance from the Court of Appeal that the existing CJEU jurisprudence will remain unchallenged. See Tunein Inc v Warner Music UK Ltd & Anor [2021] EWCA Civ 441.


\textsuperscript{142} In perhaps one of the best uses of Twitter, Martin Husovec tried to explain the current case law in one tweet here: https://twitter.com/hutko/status/773825711047033344 (accessed 3 October 2006).
involved in a balancing act between the exclusive right of the author and the interest of the public to access information. In Svensson, the court ruled that ‘making available the works concerned by means of a clickable link’ would not be a communication to a new public, as the work had already been shared by the rightsholder. In Bestwater, the court ruled that the sharing of a YouTube video by framing or embedding without the express permission of the rightsholder was also not a communication to the public.

However, the case law has become more complicated with more recent decisions. In GS Media, the court had to consider a link from a magazine to a file hosted in a file storage service in Australia, which contained thousands of pictures from Playboy. The CJEU deviated from the previous cases as it added two new requirements: one is full knowledge that the file is infringing, and that the linking is carried out for profit. The reasoning here is that in commercial settings, the person linking the content should carry out checks about whether something could be infringing copyright. Other cases dealing with communication to the public have dealt with the potential liability of secondary infringers, namely internet service providers, or makers of media players, which can be used to access infringing content, and these decisions could be relevant to NFT platforms and marketplaces.

For now, it is possible to conclude that an NFT that contains a link to an infringing copy of the work could be found to be a communication to the public in some circumstances, particularly if it is evident that the minter has knowledge of the action. The ‘for-profit’ element is already met as the token is for sale. However, there is a strong counter-argument to be made against there being any communication to the public as the link differs greatly from a normal hyperlink that is found online, as it has been explained the link is sometimes contained in the code that makes up the token. While this is often public, it may not be as easy to find as one would expect. And even if the work is online, the link may be in a smart contract that has not been shared with the public. This is increasingly common (Fig. 4). The ‘real life’ equivalent would be to infringe copyright behind closed doors.

In order to extract the link, one has to have some knowledge of the technology, and sometimes one may require knowing both the unique token ID and the smart contract address. Most of the cases dealing with hyperlinks described above are related to common web links, or even embedding and framing, so accessing the work could be much easier. One could argue that if this is a communication to the public, then this is limited to a relatively small public, in which case the threshold of what ‘public’ means has not been met. In SGAE v Rafael Hoteles, the CJEU had to determine if hotel guests watching TV in their rooms was a communication to the public, and it was found that the repeated nature of various viewers could meet the threshold. It does not appear feasible to consider a small number of technical enthusiasts as members of the public, particularly because the token itself may not be published in a platform, it consists of code that exists on a blockchain, and it is not always visible to the wider public. While it is possible to reverse engineer the link using the public smart contract, this is not always easy to achieve.

Moreover, while some links are posted in safe and reliable services that are designed for resilience, such as IPFS, most links are hosted by the platforms themselves, or elsewhere online. A phenomenon called ‘link rot’

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143 Nils Svensson and Others v Retriever Sverige AB (Case C-466/12, ECLI:EU:C:2014:786).
144 BestWater International GmbH v Michael Mebes and Stefan Potsch (Case C-348/12, ECLI:EU:C:2014:2315).
145 GS Media BV v Sanoma Media Netherlands BV and Others (Case C-160/15 ECLI:EU:C:2016:644).
147 Stichting Brein v Ziggo BV (Case C-610/15 ECLI:EU:C:2017:456).
148 Stichting Brein v Filmspeler (Case C-527/15 ECLI:EU:C:2017:300).
150 As set in SGAE v Rafael Hoteles SA Case C-306/05 [2006] ECR I-11519.
indicates that a growing number of hyperlinks in the Web lead nowhere. We could very well imagine a future of thousands of NFTs that lead nowhere, hence serving to dilute the potential argument of them infringing copyright by communicating the work to the public.

All of the above leads us to conclude that, for the most part, even an unauthorized minting of a work may not result in copyright infringement.

4.3 Platforms

It is not possible to deal with copyright infringement in NFTs without discussing the platforms where these are sold. While some tokens can be sold directly by the issuer, most NFTs are published and traded in large platforms dedicated to this market. The platform can help the issuer mint their work. They also host a page in which the asset is listed (Fig. 5).

The listing page is not the NFT itself, but these websites have the capacity of accepting payment to sell the asset, usually by allowing a buyer to connect their cryptocurrency wallet. The page also contains the issuer, the current owner (usually a wallet address) and other useful information such as a thumbnail of the work, a link to the smart contract and a link to where the work is hosted.

Because the listing contains a direct link to the work and often even a copy of the work itself, the platform would be considerably more open to liability for infringement than if it was just hosting the NFT code on its own. This means that NFT platforms must have very clear policies regarding copyright infringement of their customers, as well as a robust procedure for notice and takedown. The marketplace Foundation is one of the most prestigious marketplaces. It includes the following in its terms of use:

**Copyright Complaints:** Foundation respects the intellectual property of others, and we ask our users to do the same. If you believe that your work has been copied in a way that constitutes copyright infringement, or that your intellectual property rights have been otherwise violated, you should notify Foundation of your infringement claim in accordance with the procedure set forth below.

Foundation will process and investigate notices of alleged infringement and will take appropriate actions under the Digital Millennium Copyright Act ('DMCA') and other applicable intellectual property laws with respect to any alleged or actual infringement. A notification of claimed copyright infringement should be emailed to Foundation's Copyright Agent...

All platforms share similar terms of use, as well as automated DMCA takedown procedures. These appear to work rather well, and most copyright infringement complaints are taken down immediately.

We could try to analyse the potential liabilities incurred by platforms while allowing users to upload content that could potentially be infringing, but at the
moment, they appear to be well covered by the DMCA safe harbour by offering a clear mechanism for taking content down. Most NFT platforms at the time of writing operate out of the USA, so the compliance with the DMCA rules is of special importance. NFT marketplaces operate in a conservative environment when it comes to a takedown request: content will be removed almost immediately without questions.

Evidence of the promptness and seriousness of the removal requests can be found everywhere, but perhaps one of the most prominent cases has been that of the removal of a collectible project called Sad Frogs District, which is composed of versions of the popular online character Pepe the Frog. Matt Furie, the creator of Pepe, has also been issuing his own NFTs, so the Sad Frog project was in direct competition to some of his own tokens. He issued a DMCA complaint to the platform OpenSea, and the Sad Frog District was removed. While the developers of Sad Frog District issued a counterclaim, they did it under the name of Vladimir Putin, so the counter-notice is likely to fail. However, this serves to stress the fact that most NFT copyright conflicts will be dealt with at the platform level.

5. Copyright and scarcity

So far, this article has analysed the interaction between copyright and NFTs from a strictly legal perspective, largely ignoring some of the more theoretical questions about the role of tokens and blockchain in copyright theory. While one of the objectives of this work is to look at NFTs from a neutral perspective, it is difficult not to make some judgements about the usefulness of this technology, or even if it fits adequately under copyright protection, or even if it enhances our understanding of rights management in the creative industries.

The very nature of NFT markets goes against copyright in the first place. It could be that in some ways NFTs are incompatible with copyright. Smart contracts are presented as a manner to bypass regulation and enforcement at all stages: the disruption of legacy legal structures such as copyright law is the desired outcome.

It is no coincidence that during discussion of potential copyright infringement in the community, NFT users and artists dissuade each other from using legal recourses. Instead, they try to get the community itself to police possible violations. The goal in many cryptocurrency circles is precisely to do away with the need for lawyers and copyright. In a way, it tries to live by the motto of ‘Code is Law.’

Besides the disruptive nature of NFTs, another of the premises behind them is that of scarcity, by making non-fungible digital works available for sale. The idea is that there is value in these items because they are unique. A creator can write a song and everyone can listen to it, but the NFT is sold as a unique version of the work that has been digitally signed by the author: this in theory makes it more valuable. NFTs are therefore better understood as collectors’ items, uniquely signed versions of the work and not property of the original itself.

As we have argued, there is practically no ownership transfer involved in NFTs, with a few exceptions. As a result, the scope for copyright is limited. While there appears to be a belief in some circles that an NFT is somehow a digital title to the original, an NFT is more akin to a receipt of a signed version of the work and not the actual thing itself.

We could look at this from the perspective of the justifications for copyright; under some circumstances, there are those who argue that scarcity itself is a part of copyright. Under the economic justification, copyright is seen as generating value for the author because it creates artificial scarcity over the work. Conversely, the lack of enforcement of copyright can cause the loss

\[ \text{\footnotesize 157 Found in 17 U.S. Code § 512.} \]
\[ \text{\footnotesize 158 See P Samuelson, 'Copyright's Online Service Providers Safe Harbors under Siege' (2020) 63 Communications of the ACM 25.} \]
\[ \text{\footnotesize 159 Matt Furie, the creator of Pepe, has also been issuing his own NFTs, so the Sad Frog project was in direct competition to some of his own tokens.} \]
\[ \text{\footnotesize 160 E Genç, 'Pepe the Frog's Creator Nuked a $4 Million NFT Collection Over Copyright' (Vice: Motherboard, 20 August 2021).} \]
\[ \text{\footnotesize 161 A creator can write a song and everyone can listen to it, but the NFT is sold as a unique version of the work that has been digitally signed by the author: this in theory makes it more valuable.} \]
\[ \text{\footnotesize 162 Copyright and Attention Scarcity' (2020) 42 Cardozo Law Review 143, 146.} \]
\[ \text{\footnotesize 163 B Patrickson, 'What Do Blockchain Technologies Imply for Digital Creative Industries?' (2021) 30 Creativity and Innovation Management 585.} \]
\[ \text{\footnotesize 164 This Twitter discussion is typical of this line of thought: https://twitter.com/Anupam_btc/status/1442471958474473479 (accessed 3 October 2006).} \]
\[ \text{\footnotesize 166 Sotheby's, 'NFTs: Redefining Digital Ownership and Scarcity' (Sotheby's Blog, 20 April 2021).} \]
\[ \text{\footnotesize 167 Ibid.} \]
of value of the work as more people have access to free versions of it.169 The increasing capability of producing perfect copies of a work has been at the heart of the copyright battles of recent years, where the growing digitization of works have eroded the possible scarcity value of copyright.170

But this is only a look at scarcity as an element of the economic justification. If we look at copyright as a potential incentive to generate works, or even as a vehicle to encourage the dissemination of works, then the loss of scarcity is less serious and can explain the rise of copyleft-like licensing models that encourage the creation of a cultural commons.171

But even if we maintain the usefulness of copyright as means of maintaining an artificial scarcity, can NFTs help in propping up this justification for the existence of copyright? Not exactly: the problem is that in many ways the scarcity in NFTs is illusory, as opposed to the regulated artificial scarcity generated by copyright. As it has been covered throughout the article, the scarcity represented by an NFT is illusory because the NFT does not act as a barrier to access and copy the work: it acts as a signed receipt that the holder can display. The work itself is available to everyone else for the most part, so the scarcity is for the unique token itself and even that can be copied.172

So, if copyright generates artificial scarcity, NFTs generate no scarcity whatsoever; on the contrary, it could be used to open works into the public domain in a form of patronage.173

Moreover, NFTs appear to be in direct conflict with copyright when we look at them from the perspective of fungibility: for the most part, copyright works are intended to be fungible. This is what is often referred to in copyright theory as non-rivalrousness.174 The basic formulation of this concept often goes like this: If I have a pie, I can eat the pie, and you can't eat it. If I have a song in any format, my enjoyment of the song does not detract your own use and enjoyment of the song in any other way. The works are non-rivalrous and for all purposes fungible. It does not matter which copy of the song you are listening to, as they are interchangeable.

All this said, there is also a non-fungible element to copyright works. In principle, some copyright works start life as a unique item: think of the first manuscript of a book typed by an author or written on paper by hand, the original music written by the composer or an original sketch by a famous artist. These can be copied and published, hence the very nature of the existence of copyright protection. These originals could also have economic value on their own right as non-fungible items Artists create unique works of art all the time: a painting, a sculpture, a drawing or a photograph. These original items have value in their own as non-fungible items, but copyright grants exclusive rights on subsequent uses of their work, so that a photographer can allow a photograph to be copied and published and a painter can make copies of their work, even if the non-fungible version is held in a museum.

There can also be an interaction between fungible and non-fungible elements in art: some artists create limited editions of their own work in the shape of limited-edition lithographs or in the shape of numbered editions.

From a copyright perspective, NFTs are no different. For the most part, an NFT does not confer a title of ownership on an original work: it is just a cryptographically signed receipt that one owns a unique version of a work. So NFTs are less relevant from a copyright perspective, not only because of the reasons explored in previous sections but also because they are just metadata of the work. While the idea behind the NFT is one of scarcity, it is only an illusory scarcity: nothing stops the creator of a digital asset that is turned into an NFT to create more copies of the work and sell these ‘unique’ versions to the highest bidder. True, this would in principle dilute the value of the NFT, but the market is so full of different platforms that it may be possible to post different tokens of the same work in various platforms. There is nothing in the technical infrastructure of the Ethereum smart contract that stops the creation of more ‘unique’ versions of the same resource.

173 Take the service called ‘Knock-Off NFT’, which allows users to generate a blockchain token of an existing NFT. Available at https://www.knockoff.io/ (accessed 3 October 2006). I was able to generate a token of the famous Nyan Cat NFT using this service. Available at https://bit.ly/39Z7246 (accessed 3 October 2006).
174 See, for example, this photograph that has been released to the public after an NFT purchase: https://www.freehawaiiphoto.com/ (accessed 3 October 2006).
In many ways, this is similar to what is going on with the limited edition lithograph market, where some artists have been accused of re-issuing a work that had been sold before as a limited edition. This was already litigated in the USA, where a photographer re-issued a limited print edition in a different size, and got sued because it was decreasing the value of the sold copies. The photographer won, and the judge decided that ‘although both the Limited Edition works and the Subsequent Edition works were produced from the same images, they are markedly different’. One can see a similar decision in this instance, where there is no indication that an NFT will be in any way unique or not subject to future re-issues.

6. Conclusion

There is clearly going to be some practical interaction between NFTs and copyright, although most disputes will be handled at the platform level. As the gatekeepers of the space, marketplaces are already acting as a filter that removes possible infringement, encouraging the existence of a space where creators can offer tokens they have generated. Nonetheless, the nature of the market and the incentive of large returns will still mean that the NFT space may generate several copyright disputes.

The most relevant analysis for the future will be whether the minting of a work infringes copyright in any way. As it has been discussed in the previous sections, there does not appear to be a direct relationship between the NFT and the work that was used to create it. At least from the perspective of the UK jurisdiction, we could make a strong argument that the act of minting an NFT, even without authorization, will not in any way infringe copyright. Closer inspection will have to be taken with regard to communication to the public by means of a link contained in a token. It is the argument presented in this article that while most NFTs contain a link to a work, this link could be obscured, particularly if the smart contract has not been made available.

As the NFT hype continues unabated, it is likely that we will encounter more examples of possible copyright infringement. It will be important to look at the type of NFT that is being shared, and whether it contains a link to a digital copy.

One of the best possible uses for NFTs will be in some form of rights management, particularly the collection of royalties. The automated nature of the smart contracts will lend itself to this function so, perhaps, once the hype abates, more practical uses will emerge. There may be a problem in trying to generate scarcity when copyright works better with non-scarcity. The more popular a work is, the better. More education for artists is still required, and the level of misinformation and misunderstanding of NFTs is staggering.

There are still many questions open with regard to NFTs and copyright. The present article has not dealt with the question of moral rights, which presents a very interesting interface that should be studied in the future. There is also a growing interface between NFTs and artificial intelligence-generated works. Similarly, there should be further exploration of NFTs and copyright theory, as we have only started to scratch the surface of a vast topic.