Digitization of Art, NFTs, and Tools for the Circulation of Creative Works

Emanuela Andreola*

Abstract

The purpose of this paper is to examine the effects of the digitization of creative works on both the subjective right of access to culture and art and the new modes of exchange in the digital market for artistic works. When digitization becomes crypto-art and creations are represented by NFTs, the question arises as to whether the contractual instruments of circulation on blockchain platforms can adequately protect not only the right of the contracting party but also copyright in the event of the production of fake tokens. Finally, the cryptographic language used to express the information contained in the token requires special computer expertise, which, by excluding a portion of the user audience lacking specific technological ability, could create a digital divide between those who have knowledgeable access to blockchain platforms and those who are unable to understand the contents of negotiating transactions on art tokens, especially when it comes to ascertaining the authenticity of the digital artwork.

I. Art in the Digital Age and the Telematic Dissemination of Works

Art, an expression of human creativity that has always mirrored human evolution and charted a course between tradition and novelty, is today particularly affected by the impact of the latest technologies. On the one hand, these technologies reshape the artistic experience, expanding creative tools with unprecedented forms and varieties of execution, and operating directly on the genesis of the work; on the other, they expand the channels of access allowing the contemplation of artistic creation.

Virtual space can create immersive environments, such as the metaverse, where the viewer enters completely, remaining enveloped and accessing the vision of the work through a more complex and interactive sensory experience.[1] The artist, in turn, experiments with new creative forms in the virtual world, including through

* Assistant Professor of Private Law, Niccolò Cusano Telematic University of Rome.

[1] C. Galli, 'Metaverso o metaversi tra innovazione tecnica e innovazione giuridica' *Il diritto industriale*, 109 (2023). Algorithms can generate works of art (musical compositions, drawings, poems) or be used to explore combinations of colours, shapes, and patterns more quickly and diversely than could be done manually. Another area for the application of new technologies in the arts is 3D printing, or additive manufacturing, which enables the creation of three-dimensional objects, layer upon layer, from a digital model, with the advantage that artists no longer have to use expensive materials or specialized laboratories. In addition, 3D printing allows for precision and reproducibility without losing full correspondence to the original piece.

so-called 'augmented reality', which allows digital elements to be superimposed on the real world as an input to which creative value can be attributed.[2]

The art sector is also increasingly reserving space for the technology associated with the digital reproduction of the original work, including 'non-digital native' work.[3] The phenomenon of 'digitization of art' properly refers to a technique of converting the measurement of a physical phenomenon into a numerical representation that is translated into a set of computer data contained in a file. In this way, artistic expressions that we usually imagine as inextricably linked to a material element (a photograph, a painting, a piece of music) can today be constituted by a digital sequence of information, processed through automatic tools such as computers. Moreover, the phenomenon of digitization also includes the stage of circulation of the file representing the work in the online, with new forms of dissemination and economic exploitation in the art market.[4]

The phenomenon raises a number of reflections. A first consideration of a juridical-sociological nature concerns the effect of the use of digital technology on the right of access to art, an effect that consists in a global sharing, via telematics, of the artistic heritage, without intermediation by the institutions that usually provide exhibitions. The increasingly sophisticated services available on the internet are the instrument to do so. We refer not only to search engines used to find information, learn and stream audio and video data playback, but also to blockchain used for exchanging and investing in the art market, as will be seen below.[5]

In this field, as in other areas, access to 'the net' becomes a tool for exercising rights, and, more specifically, the right to information, culture, and democratic participation. The opportunity is well summarized in a 2009 recommendation of the European Parliament:

> 'the evolution of the internet shows that it is becoming an indispensable

[2] On the concept of augmented reality and on multimedia works, created to allow the viewing of cultural goods, as new and different cultural products rather than the underlying cultural goods, see G. Stanzione, 'Beni culturali, realtà aumentata e nuove tecnologie dell'informazione: profili giuridici' *comparazionedirittocivile.it*, February 2019, 1-38.

[3] It is preferable to contrast the term 'digital' with 'non-digital-native' instead of 'analog' - the latter being a term mistakenly used in opposition to the term 'digital' and one associated with an 'old' or 'past' meaning. Indeed, analog is a quantity that can take on all intermediate values within a given range, obtained by means of physical quantities (usually currents or voltages) that vary continuously.

[4] G. Sapelli, 'Circolazione dell'arte, circolazione della moneta del mercato dell'arte', in G. Negri-Clementi ed, *Il diritto dell'arte. L'arte, il diritto e il mercato* (Ginevra-Milano: Skira, 2013-14). The author highlights that the art market is a recent institution that only came into existence with the full unfolding of the monetary economy and thus with the capitalist system. Before capitalism, one did not buy the work of art, one bought the artist. The patron bought the work not to sell it but to own it forever. The art market is nothing but the transposition to the terrain of social relation of the Marxian principle of surplus value, the assessment of the value of the sale must be higher than the essay assessment of the purchase of the work. What is striking in the art market, dominated by intermediaries, is the continuous, natural, and spontaneous reproducibility of the work of art.

[5] The term blockchain refers to a technology based on a chain of blocks that record and manage accounting transactions accessible only to the users of each node, to ensure traceability.

> tool for promoting democratic initiatives, a new forum for political debate (...), a key global tool for exercising freedom of expression and developing commercial activities, as well as a tool for promoting the acquisition of IT skills and the dissemination of knowledge (e-learning)'.[6]

The expansive, globalizing and 'democratizing' effect of the net can also contribute to realizing the function of art as a common good when considering the right of access to culture as a fundamental right.[7] The constitutional relevance of the artistic phenomenon is confirmed by several provisions (Arts 9, 33, and 34 of the Italian Constitution) that deal in different respects with the regulation of the 'cultural fact' as a whole.[8] While Art 33 of the Italian Constitution represents the foundation of the freedom of culture, Art 9 grounds the obligation to promote its development and effective accessibility to all citizens.[9] The freedoms of artistic expression, scientific research, and teaching are contemplated, albeit with different formulations, in the Charter of Fundamental Rights of the European Union,[10] in the Convention for the Protection of Human Rights and Fundamental Freedoms,[11]

[6] Recommendation of the European Parliament of 26 March 2009 addressed to the Council, on strengthening security and fundamental freedoms on the internet, points *(a)* and *(b)*; S. Rodotà, *Il mondo nella rete. Quali i diritti, quali i vincoli* (Roma-Bari: Laterza, 2014), 33. The author defines the right of access to the internet as an effect of a new distribution of social power, stating that it presents itself as a synthesis between an instrumental situation and a tendentially open set of powers that the person can exercise on the network.

[7] M.R. Marella, 'L'arte come bene comune', in G. Liberati Buccianti ed, *L'opera d'arte nel mercato. Principi e regole* (Torino: Giappichelli, 2019), 134; Id, 'Le opere di street art come urban commons' *Rivista critica del diritto privato*, 471 (2020). The author, also with reference to urban art, theorizes the existence of a fundamental right to culture. On the notion of 'common good,' she recalls the definition adopted by the so-called Rodotà Commission, appointed in 2007 to rewrite the regulation of public goods, which never became law but which was followed by case law, according to which common goods are described as things that express utilities functional to the exercise of fundamental rights as well as to the free development of the person and that must be protected and safeguarded by the legal system also for the benefit of future generations. On this point, see also A. Iuliani, 'Prime riflessioni in tema di beni comuni' *Europa e diritto privato*, 617 (2012). According to the author, if property is conceived as the first form of freedom and the civil law system becomes the 'realm of realized freedom,' the category of the 'common' good would be in radical countertendency insofar as it exalts individual freedom as part of the world of being, favouring those social relations founded on the satisfaction of the needs of being and not only of having.

[8] On the distinction between the concepts of 'art' and 'science' in Art 33 Italian Constitution, see, for example, A. Mura, in M. Bessone et al eds, *Rapporti etico-sociali. Art. 29-34* (Bologna-Roma: Zanichelli-Il Foro Italiano, 1976) 227-228. The author, after premising that the manifestations of art and science do not seem to completely coincide with the manifestations of thought, states that an artistic activity has for its prevailing, if not exclusive, purpose that of arousing emotional states that are not reducible to logical propositions; while scientific activity may well limit itself to research alone, without necessarily arriving at a communication of results (ie, a manifestation of thought).

[9] In this sense, M. Ainis, *L'intervento culturale. Promozione e libertà della cultura nel disegno costituzionale* (Roma, 1988), 125; Id and V. Sgarbi, *La Costituzione e la bellezza* (Milano: La Nave di Teseo, 2016), 16.

[10] Art 13 (freedom of the arts and sciences) and Art 14 (right to education) of the Charter of Fundamental Rights of the European Union [2000] OJ C 364/1.

[11] Art 2 (right to education) of the Protocol to the Convention for the Protection of Human

in the Universal Declaration of Human Rights,[12] as well as in almost all European Constitutions, thus confirming the universal character of the aforementioned freedoms as founded on the enhancement of the human person.

Having framed the phenomenon of digitization from the perspective of the individual right to enjoy art, it is necessary to reflect on the objective aspect of the case. The conversion of the work into a representative file has brought about an extraordinary structural transformation of artistic creations transposed onto the Web, consisting in the dematerialization of the medium and its replacement with the virtual element of computer data.[13] With respect to the latter, when it does not itself constitute a digital native creative work, the technological reproduction of the work raises a number of questions, some older, about the artistic value of the reproduction, and others more recent, about the essence of the digital good.[14]

Already in 1936, the well-known German philosopher Walter Benjamin lamented the 'loss of the aura' surrounding the work of art, caused by its technical reproducibility. In this view, reproducibility desacralizes the concept of the work of art, since this work is a unique and unrepeatable commodity.[15]

Rights and Fundamental Freedoms, signed in Paris on 20 March 1952 ETS no 9.

[12] Arts 22, 26, and 27.

[13] S. Stabile, 'Internet e diritto d'autore: il cyberspace e la mondializzazione delle opere' *Il diritto industriale*, 87 (1999). The author highlights how the internet medium spreads a new cultural product – cyberspace – with the effect of bringing about a 'globalization of culture'. The globality of the medium envisions new scenarios for copyright law, allowing for the absence of intermediaries in the dissemination of works and the creation of multimedia content by multiple users, even simultaneously. For this reason, the classification schemes typical of traditional copyright law (subjects, interests involved, rights related to the circulation of works) must be revised in light of the new modes of creation, enjoyment, and dissemination.

[14] According to Art 13 legge 22 April 1941 no 633 (Copyright Law), the reproduction of a work is an operation consisting of the multiplication of the work into copies, direct or indirect, temporary or permanent, in whole or in part, in any manner or form, such as hand copying, printing, lithography, engraving, photography, phonography, cinematography and any other reproduction process. The right to reproduce a work of art belongs exclusively to its author, subject to the exceptions set forth in Art 70, according to which the abridgment, quotation or reproduction of passages or parts of works and their communication to the public are permitted if carried out for the use of criticism or discussion to the extent justified by such purposes and provided that they do not constitute competition for the economic use of the work; if carried out for the purpose of teaching or scientific research, the use must also be for illustrative purposes and for non-commercial purposes.

[15] W. Benjamin, *L'opera d'arte nell'epoca della sua riproducibilità tecnica* (Roma: Donzelli, Edizione integrale comprensiva delle cinque stesure, 2019), 5-8 e Id, 'Piccola storia della fotografia' in Id, *L'opera d'arte nell'epoca della sua riproducibilità tecnica* (Torino: Einaudi, 1991), 76-77, quoting Baudelaire's critique: 'if photography is allowed to supplement art in some of its functions, the latter will soon be supplanted and ruined by it, thanks to its natural alliance with the multitude.'

On the lost symbolism and sacredness of art, see E. Falletti, 'Gli NFT e le opere d'arte: rivoluzione o illusione? Alcune sommarie riflessioni (non solo) giuridiche', in V. D'Antonio and A. Musio eds, *I Non Fungible Token*, (Pisa: Pacini Editore, 2024), 281. The author questions whether the lost sacredness of art – resulting from its reproduction in a 'massive' way as described by Benjamin and Warbur – will stifle the genuineness of artistic content and lead to distorting pollution. See also C. Aguilar Campos, 'La adaptación del concepto de aura en el arte a partir de los NFT. Caso: Beeple' *Anuario de investigación de la comunicación CONEICC*, XXIX, available at https://tinyurl.com/42eb8d6x (last visited 31 January 2026), who, using the concept of 'aura'

Without entering into the philosophical debate on the communicative effectiveness of an artistic message through the emotion aroused by the medium, we would limit ourselves here to stating that, in the case of the digitization of art, the phenomenon is more complex and the new artistic fact is something different from a mere technical reproduction of the original. In fact, in addition to the digital creation itself, the virtual replication produces a different legal good from the physical work, as it gives the user other and additional usefulness. The digital copy guarantees the user instant access and shareability of the information; the original, on the other hand, essentially offers the consumer the intensity, the energy and the emotion that Benjamin termed 'aura.' Based on this clarification, the legal analysis of the digitization of art cannot disregard the transformation of the tangible artistic good into an intangible good, and, to remain in the realm of visual art, shift the focus from the canvas of the painting to the multimedia file that represents it.

Since virtual reproduction, understood as a set of processed digital information – to which we will return in more detail – constitutes an asset subject to legal relationships and acquires economic value in the art market, it is necessary to first contemplate the legal categorization of such an asset devoid of corporality.[16] In particular, the question arises as to whether the new form of wealth generated by the circulation of digitized art falls under the category of intangible goods. To this end, it is not sufficient to invoke the notion of a thing (according to Art 810 Civil Code, things that can be the object of rights are goods); instead, recognition by the legal system is also necessary.[17] As has long been highlighted, the term 'intangible good' cannot encompass all entities characterized by the generic trait of the absence of the requirement of materiality; otherwise the concept would merely describe a naturalistic reality and lose value on the legal level.[18] In fact, a delimitation of the notion requires a reconnaissance of the normative references, from which in the first place we derive the rule that only entities that realize a creative contribution are capable of being included in the category. This essential requirement, which is explicitly referred to only for intellectual works for the purpose of applying copyright protection (Art 2575 Civil Code), actually concerns all normative cases in which reference is made to 'invention' as a prerequisite for protection.[19] Moreover, the

described by Benjamin, wonders what role it plays in digital art and in particular in crypto-art, given the activity of the so-called *prosumer* (the net user who at the same time is both consumer and creator of content).

[16] V. Zeno-Zencovich, 'Big data e epistemologia giuridica', in S. Faro et al eds, *Dati e algoritmi. Diritto e diritti nella società digitale* (Bologna: il Mulino, 2020), 16; P. Costanzo, 'La circolazione dell'informazione giuridica digitalizzata: fenomenologia e profili problematici' *Il diritto dell'informazione e dell'informatica*, 580 (1999).

[17] A. Iuliani, n 7 above, 628, fn 28.

[18] G. Ferri, 'Creazioni intellettuali e beni immateriali', in *Studi in memoria di Tullio Ascarelli* (Milano: Giuffrè, 1969), 617.

[19] D. Messinetti, 'Beni immateriali. 1) Diritto privato' *Enciclopedia giuridica* (Roma: Treccani, 1988), V, 1-16, according to which the reference to the term 'invention' clearly postulates that the creation has those requirements of originality for it to constitute a creative contribution.

intangible good is necessarily reproducible, lending itself to economic use.[20] If these prerequisites are met, the case for protection of the intangible asset is completed with the acts of publication and patenting (Arts 2584, 2592, and 2593 Civil Code). In this sense, it can be said that intangible assets do not exist in nature but are a creation of the legal system.

Having clarified this in general terms, it is necessary to explain whether the theoretical premises can also apply to the so-called 'new intangible goods', represented by combined and reprocessed digital information. With reference to software, the fact that it is the result of an intellectual computer creation cannot be questioned. However, two questions arise: the first, whether the software is the object of exclusive appropriation; the second, whether it can be the object of exchange. Without intending to argue here about the scope of the legal provisions mentioning 'computer programs,'[21] and embracing the thesis that software is generally put in the same class as intellectual work and as such is protectable under copyright law,[22] it can be said that the asset can circulate and that acts of disposition in favour of a

[20] ibid 1. The author points out that, with respect to some intellectual works intended to be realized in a single copy, the question arises whether an intangible good can even exist. The protection offered by the law in such a case concerns protection of the author and not the work itself.

[21] See the original wording of Art 12(2)(b), regio decreto 29 June 1939 no 1127, according to which computer programs are not considered inventions. Subsequently, software, as an intangible asset with autonomous protection, is now expressly regulated by the Copyright Act, following the amendment introduced by decreto legislativo 29 December 1992 no 518, which thoroughly amended and supplemented Art 1 legge 22 April 1941 no 633 on copyright. Thus, computer programs are now defined as intellectual works of a creative character in the literary and artistic fields. In particular, the subjects of protection are both 'source programs', understood as the language in which programs are written, and 'object programs', understood as the translation of the program language into bits or machine language. This overcame the debate between that part of commentators who held that copyright law should apply to software (U. Carnevale, 'Sulla tutela giuridica del software' *Quadrimestre,* 254 (1984) and those, on the other hand, who argued that patent law should apply, classifying software as industrial inventions, despite the explicit exclusion contained in Art 2 decreto del Presidente della Repubblica 22 June 1979 no 338 (now repealed by decreto legislativo 10 February 2005 no 30) (G. Ghidini, 'I programmi per computers fra brevetto e diritto d'autore' *Giurisprudenza commerciale*, 251 (1984)). In this sense, see the examination of R. Moro Visconti, 'La valutazione economica del software' *Rivista di diritto industriale*, 421 (2014).

[22] U. Carnevale, n 21 above, 254. On contracts having as their object software, see G. Di Giandomenico, *Natura giuridica e profili negoziali del software* (Napoli: Edizioni Scientifiche Italiane, 2000), 356, for whom the intangible good can be identified in its objective autonomy only when it assumes the minimum requirements that allow it to be distinguished from generic intellectual activity of the individual, that is, when it is identified in a piece of information and when it is the effect of the processing and synthesis of a sequence of input data capable of creating a new item of data. In case law, see Corte di Cassazione 13 June 2014 no 13524, *Rivista di diritto industriale*, 259 (2015), postulating that copyright protection concerning computer programs ('software', which represents the creative substance of computer programs), like that concerning any other work, includes the requirement of originality; Tribunale di Milano 27 May 2014, available at www.leggiditalia.it, according to which in the case of an industrial invention made in fulfilment of a contract, having as its object the inventiveness for which remuneration is provided, the rights deriving from the invention itself belong to the employer, except for the right due to the inventor to be recognized as its author. Likewise, in the event that the developer of the software is a self-employed person, in the absence of any agreement to the contrary, the right to economic exploitation of the software belongs to the principal.

person who can appropriate it under a title of ownership or use are permissible.[23] From a functional point of view, the attribution of the good-program can take place through the contracts of '*cessione*' (Art 1470 Civil Code), '*opera*' (Art 2222 Civil Code), or '*appalto'* (Art 1654 Civil Code), regardless of the intangible nature of the data contained in the software. In the virtual environment, the medium is the telematic contract.[24]

However, nowadays the object of legal relationships is increasingly dematerialized, and the digital data exchanged does not always qualify as an intangible good, according to the notion just mentioned.[25] In particular, the digital reproduction of art, contained in a complex file and inserted in the telematic circuit, could lack the requirement of creativity and possess only the requirement of reproducibility, therefore obtaining the same protection granted to the tangible good ('thing' within the meaning of Art 810 Civil Code), even if it is a good without corporality.

Hence, there is a need to clarify whether the legal assets can also include things without physical support (in addition to the category of typical intangible assets)[26] and therefore be considered as objects of rights, within the scope of Art 810 Civil Code. In less recent times, the scholarly opinion was divided between those who denied the possibility of configuring intangible resources as goods, based on the consideration that their immateriality made them unsuitable as the object of real rights,[27] and those who – starting from the assumption that the notion of a thing in Art 810 Civil Code is not naturalistic, but economic and social – opposed the

[23] D. Messinetti, n 19 above, 9, who states that once an exclusive right to software is established, one cannot be prevented from its appropriation by another party who has equal title to the property on the basis of authorship.

[24] In terms of protection, the intangible nature of property legitimizes the use of specific remedies, which are recognized regardless of the injury to possession. While for tangible property the action to recover the property is brought through an application for reinstatement (Art 1168 Civil Code), in the case of intangible property, the action for injunction in the interlocutory proceedings constitutes a protective means (Art 700 Code of Civil Procedure).

[25] On the legal objectivity of intangible assets, see once again D. Messinetti, n 19 above, 4. On the notion of 'digital information', see M. Giuliano, 'Le risorse digitali nel paradigma dell'art. 810 cod. civ. ai tempi della blockchain' *Nuova giurisprudenza civile commentata*, 1214 (2021). According to the author, digital information, precisely because of its numerical nature, can be infinitely expandable, as it can be reproduced without limits and be a-spatial, thus allowing it to be anywhere at any instant. Starting as raw data – and through a process of elaboration and transformation – it can become something more complex, such as a literary or cinematographic work, a database, or software; it can become the subject of legal relationships and acquire economic value; it can therefore become a marketable product in its own right, a legal asset endowed with utility for those who have the right to use it and hence something relevant to the legal system.

[26] The Commission on Public Goods, chaired by Stefano Rodotà, established at the Ministry of Justice, by ministerial decree on 21 June 2007, had included in the definition of goods under Art 810 Civil Code also things, whether tangible or intangible, whose utilities may be the subject of rights. On the ambiguity of the wording of Art 810 Civil Code, see V. Zeno-Zencovich, 'Cosa' *Digesto discipline privatistiche. Sezione civile* (Torino: UTET, 1989), IV, 438.

[27] R. Franceschelli, 'Beni immateriali. Saggio di una critica del concetto' *Rivista di diritto industriale*, 394 (1956).

legal objectivity of intangible entities.[28]

While for new digital entities, which are not recognized as intangible goods by law, the reference continues to be Art 810 Civil Code, the concept of 'thing' needs to be adapted to the new reality,[29] not attaching particular relevance to material consistency or the mode of apprehension, but instead focusing on the interest protected. Pending a legislative amendment we are, meanwhile, witnessing an inverse path, whereby the legal system, in implementing EU directives, progressively identifies the character of intangible goods as a sequence of complex digital information, like in the case of databases, know-how,[30] intangible cultural goods as regulated by the Code of Cultural Property, and the UNESCO Convention for the Safeguarding of Intangible Heritage.[31] The gradual regulatory attraction to the category of intangible assets in the artistic sector only confirms the growing economic significance of the digitization of culture and art and the need to explain the phenomenon from the standpoint of protection.[32]

[28] T. Scozzafava, 'Dei beni', in P. Schlesinger ed, *Il Codice Civile. Commentario* (Milano: Giuffrè, 1999), 90, for whom an entity becomes the object of legal discipline when human interests of any nature are pinned on it, which in a given historical-cultural context are judged worthy of protection; F. De Martino, 'Beni in generale, proprietà', in A. Scialoja and G. Branca eds, *Commentario al Codice Civile* (Bologna-Roma: Zanichelli, 1976); D. Messinetti, n 19 above, 9. According to M. D'Onofrio, 'La versatilità degli NFT e le loro funzionalità nel campo della circolazione e catalogazione delle opere d'arte' *Aedon*, 81 (2024), NFTs are 'thing' within the meaning of Art 810 Civil Code.

[29] N. Lipari, *Le categorie del diritto civile* (Milano: Giuffrè, 2013), 135, on the new intangibles; Id, *Vivere il diritto* (Napoli: Edizioni Scientifiche Italiane, 2023), 149, on the principle of effectiveness as a hermeneutic canon; M. Giuliano, n 25 above, 1214; F. Piraino, 'Sulla nozione di bene giuridico in diritto privato' *Rivista critica di diritto privato*, 470 (2012).

[30] With the decreto legislativo of 6 May 1999 no 169, the Italian legislature in fact implemented European Parliament and Council Directive 96/9/EC of 11 March 1996 on the legal protection of databases [1996] OJ L77/20, amending legge 22 April 1941 no 633. Following this amendment, copyright protection is extended to databases, understood as collections of works, data, or other independent elements systematically and methodically arranged and individually accessible by electronic means or otherwise. Regarding *know-how* (understood as the set of knowledge and operational skills necessary to carry out a given activity), it is now the subject of specific regulation under the Industrial Property Code, which in Chapter II, Section VII, Art 98, under the title 'Secret Information', recognizes specific protection for business information and technical-industrial experience including business information, which is subject to the legitimate control of the holder, where such information is secret, has economic value (as secret), and is subject to, as exercised by the persons having legitimate control over it, reasonably adequate confidentiality measures.

[31] Convention for the Safeguarding of the Intangible Cultural Heritage, adopted by UNESCO, in Paris, October 17, 2003, available at www.unesco.it.

In the wake of a streamlining of profound cultural and artistic property digital evolution, we find the National Plan for the Digitization of Cultural Heritage, available at https://tinyurl.com/3an6zdth (last visited 31 January 2026), prepared by the Central Institute for the Digitization of Cultural Heritage, which summarizes the strategic vision with which the Ministry of Culture intends to promote and organize the process of digital transformation in the five-year period of 2022-2026, addressing museums, archives, libraries, central institutes, and state cultural places that own, protect, manage, and enhance cultural heritage. The goals include expanding forms of access to cultural heritage and digitization.

[32] One can think of the digital collections of the works of the Italian Renaissance masters, sold on the digital marketplace and the subject of reproduction on clothing, or the success of the digital work 'the first 5000 days' by artist Beeple, which was sold online for $70 million by Christie's auction house.

II. From Digital Art to Crypto-art: The Representational Function of Artistic NFTs

As mentioned, digital art refers to the practice that uses digital technology as part of the creative or reproduction process for the purposes of exhibiting, presenting, and circulating works.[33]

Compared to this category, the narrower phenomenon of crypto-art, essentially related to blockchain technology, stands out because it concerns digital works published directly on a blockchain platform.[34] The aforementioned technology is defined by the Italian legislature in decreto legge 14 December 2018 no 135, converted into law with amendments by legge 11 February 2019 no 12, as being based on a system of distributed ledgers,[35] and, without delving into its operating paradigms here, it presents itself as a technological model capable of supporting applications based on a decentralized system of validation and information sharing. The 'distributed' nature of the registry implies that each node in the network plays a role in verifying information, sending it to the next, and fixing the

[33] R. Moro Visconti, 'La valutazione dell'arte digitale' *Rivista di diritto industriale*, 472 (2021), distinguishes digital art from electronic art, which is broader because it involves many interrelationships between art and technology.

[34] On the notion of blockchain and the relationship between blockchain and distributed ledger technology, P. Matera and A. Benincampi, 'Blockchain', *Digesto discipline privatistiche. Sezione commerciale* (Torino: UTET, 2022), IV, 4. The authors explain that blockchain technology is a subset of the broader set of 'distributed ledger technology' (or DLT). It has the essential characteristics of DLT, while adding its distinctive features that lead to practical advantages. Belonging to the DLT macrocosm, blockchain operates through a distributed ledger, recording data and the transactions of parties in a digital repository. In essence, a DLT system consists of a structured database that allows its data to be held and shared in a distributed and decentralized manner, while ensuring its integrity through a consensus-based validation protocol. On the origin of blockchain and the relationship between blockchain and smart contract, E.W. Di Mauro, 'Smart Contracts Operating on Blockchain: Advantages and Disadvantages' *The Italian Law Journal*, 109 (2022). About the remedy for smart contracts' breach, take a look at R. Herian 'Smart Contract Performance and the Rise of Restitution', available at https://tinyurl.com/yc33fj7h (last visited 31 January 2026).

[35] Art 8-*ter* decreto legge no 135/2018 (Simplification Decree 2019). Distributed registry-based technologies are defined as IT systems and protocols that rely on a shared, distributed, replicable, concurrently accessible registry with a decentralized architecture and cryptographic foundation. These technologies allow for the recording, validation, updating and storage of data both in plain and encrypted form, which is verifiable by all participants and cannot be altered or modified. See also decreto delegato 27 February 2019 no 37, which specifies that a Distributed Registry is composed of validated transaction blocks, arranged sequentially. New blocks can are added via cryptographic hash functions or equivalent technologies designed to be tamper-resistant and ensure the immutability of recorded transactions. Services delivered through the use of a blockchain platform may be classified under the reference mode category of cloud computing as defined by the National Institute of Standards and Technology. On this point, see P. Mell and T. Grance, 'The NIST definition of cloud computing', available at https://tinyurl.com/52xfz4ba (last visited 31 January 2026). On the notion of a 'distributed ledger', see also European Parliament and Council Regulation (EU) 2022/858 of 30 May 2022 on a pilot regime for market infrastructures based on distributed ledger technology, and amending Regulations (EU) No 600/2014 and (EU) No 909/2014 and Directive 2014/65/EU [2022] OJ L151/1, implemented in Italy by decreto legge 10 May 2023 no 25, on the digital circulation of financial instruments.

data and transactions recognized by all nodes in a chain composed of blocks. This is a true public and shared ledger that is updated automatically and simultaneously on each of the nodes participating in the network. All transactions are confirmed through cryptographic software that verifies the packet of data signed with a private key. The system guarantees the digital identity of those authorizing the exchanges.

With regard to the technological context briefly described above, there is no universally accepted notion of crypto-art. In fact, while some limit the concept to cryptographic works strictly tied to blockchain infrastructures,[36] others tend to give the expression a broader meaning, encompassing any creative manifestation that (whether analog or, better still, non-native digital) is '*tokenized*'. A tokenized manifestation is crypto-art that has been transformed into a non fungible token (NFT), a unique digital marker registered on a blockchain platform, representative of the artistic work itself.

In both cases, the concept of crypto-art recalls a market model organized along the lines of the bitcoin market and thus one that is essentially speculative;[37] intangible assets circulate in this market, with NFTs that are intended to certify ownership and make every exchange traceable.[38] In the absence of precise normative regulation and in the absence of case law,[39] some defining elements of

[36] P. De Filippi, 'Blockchain-based Crowdfunding: what impact on artistic production and art consumption?' *SSRN*, available at https://tinyurl.com/5hca4h4x (last visited 31 January 2026). A classic example of crypto- art is that of Mike Winkelmann, known as Beeple, an American digital artist. His digital-native artworks consist of jpeg images – infinitely replicable and downloadable– that have been linked to non-fungible tokens (NFTs) since their creation. Another example of modern art associated with a token is the gif of a rainbow kitten flying in a starry sky by artist Chris Torres, known as 'Nyan Cat', which was auctioned for 300 Ethereum (about $590,000) on the marketplace Foundation. Among the pioneers of the Italian movement is the duo Hackatao, formed by Sergio Scalet and Nadia Squarci, whose solo exhibition Fight Fear was the first Italian exhibition of this crypto-art movement.

[37] C. Sandei, 'Blockchain e sistema autoriale: analisi di una relazione complessa per una proposta metodologica' *Nuove leggi civili commentate,* 194 (2021). The author highlights the fact that artists increasingly use initial coin offerings (ICOs) to issue 'copyright tokens' and thus finance their activity. The mechanism is reminiscent of reward-based crowdfunding, with the difference being that, while the 'reward' usually consists of a good (tangible or digital) related to the creative activity (a copy, gadget, etc.), in this case the subscriber, in return for his or her funding, receives a proportional number of tokens, representing a share in the copyright.

[38] E. Falletti, n 15 above, 287, writing on NFTs as a speculative tool, points out that although NFTs are not considered traditional art, they are understood as very exclusive luxury items, whose uniqueness is ensured by blockchain technology. They provide verifiable certainty of provenance and appeal to a specific niche of people, typically affluent, tech-savvy individuals from higher social classes. According to C. Trevisi et al, 'Non-Fungible Tokens (NFT): business models, legal aspects, and market valuation' *Media Laws*, 340 (2022) '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'.

[39] M. Onza, 'Non-fungible token e diritto d'autore: (ipotesi di) ricostruzioni e (di) interferenze' *Rivista di diritto industriale*, 103 (2023) states that NFTs are currently a self-regulated 'technical and socio-economic phenomenon' and the result of private autonomy (the individual who dictates the

an 'artistic token' can be found in the Directoral Decree of the Ministry of Culture in the aforementioned National Plan for the Digitization of Cultural Heritage of 2022-2023.[40] Here, the token is linked to the circulation of (digital) copies or serigraphs. Specifically, the Ministry clarifies that an NFT is a unit of value, a digital asset that incorporates or represents a subjective right. According to the ministerial document, under the definition of assets in Art 810 Civil Code – whereby things that can be the subject of rights are assets – tokens can be considered digital legal assets subject to the rights under the same provision, non-fungible, and not mutually interchangeable.[41] Further defining criteria are derived from the European Parliament and Council Regulation (EU) 2023/1114 of 31 May 2023 on markets in crypto-assets, and amending Regulations (EU) No 1093/2010 and (EU) No 1095/2010 and Directives 2013/36/EU and (EU) 2019/1937, known as the Markets in Crypto-Assets (MICA) Regulation,[42] which, under Art 2(3), however, does not apply to digital art and collectibles whose value derives from the unique characteristics of the crypto-asset and whose utility is attributed to the holder of the tokens. These types of unique and non-fungible assets may have a market and a speculative function, but they are not interchangeable.[43]

rule is the recipient of its effects) and not of heteronomy (where there is no coincidence between the individual who sets the rule and the recipients of its effects). P.R. Banchio, 'Digital Art. The Crypto Art Market through the legal circulation of the NFT' (2023), available at https://tinyurl.com/mt2fvvkc (last visited 31 January 2026) points out the main problem of the use of the NFT, that is the lack of specific regulation since almost no legislation contains a definition or regulates such tokens. On the lack of legislation to NFTs, see also G. Vulpiani, 'Non-Fungible Tokens: An Italian Private Law Perspective' *The Italian Law Journal*, 363 (2023).

[40] Decreto direttoriale 30 June 2022 no 12 approving the national plan for digitization of cultural heritage; decreto ministeriale 11 April 2023 no 161, laying down the guidelines for determining the minimum amounts of fees and royalties for the concession of use of assets in consignment to state institutes and places of culture.

[41] The non-binding document 'Discovering NFTs' is available at https://media.beniculturali.it. It clarifies that each NFT is linked to an underlying asset, for which it constitutes the asset's representation in the digital ecosystem. However, the NFT is not legally equivalent to the underlying asset itself, and the rights associated with the latter do not automatically transfer to the NFT. There are, therefore, two distinct and separate assets: the unique underlying asset: the original NFT (unique) and the copies of the NFT (in a predefined variable amount). The NFT is therefore an instrument endowed with intrinsic security since only the private key in the possession of its owner allows its disposition, though this is an improper certificate of ownership given the decentralized system within which it is inserted – the blockchain – where no authority a priori holds any powers endowed with sovereignty or official status.

[42] F.P. Patti, 'L'offerta al pubblico di cripto-attività nel titolo II del Regolamento Mica' *Rivista di diritto civile*, 97 (2024), in particular on the rules on public offerings, the liability regime related to marketing communications, and the transparency and retention obligations incumbent on the offerors also with reference to the right of withdrawal.

[43] See European Parliament and Council Regulation (EU) 2023/1114, Recital 10. Recital 11 specifies that the fractions of a unique and non-fungible crypto-asset should not be considered unique and non-fungible, that the issuance of crypto-assets as non-fungible tokens in a large series or collection is an indicator of their fungibility, and that the mere attribution of a unique identifier to a crypto-asset is not in itself sufficient to classify it as unique and non-fungible. It is, therefore, stressed that for the crypto-asset to be considered unique and non-fungible, the assets or rights represented should also be unique and non-fungible.

In light of these descriptive fragments, it could be argued that the artistic token represents the means by which digital art becomes crypto-art.[44] More properly, the non-fungible token consists of an algorithm that contains a set of information and a link to a particular digital object. The information is protected by a cryptographic system, consisting of a public key that is known to all participants in the system and a private key that is available only to the owner of the right represented by the crypto-asset.

Having clarified the main aspects and prior to investigating the function of the NFT in the artwork circulation system, it is necessary to examine the representational aspect of the art object. As noted above,[45] the non-fungible token, being a virtual replica of a physical or native digital work, is distinct from the underlying digital object; consequently, the right over the NFT does not coincide with the copyright over the represented digital object. The right over the NFT consists, in fact, in the power to enjoy the digital work; the copyright over the digital object consists, on the other hand, in the power to inhibit third parties from reproducing the digital object. Only the owner of the copyright in the underlying digital object or the one authorized under a license agreement – and within its limits – is entitled to create the NFT. Thus, an artist who creates a new digital work has the right to turn it into an NFT and sell it, or if a gallery owns the digital rights to a collection of works, it can legitimately create and assign NFTs associated with the underlying works.

Given the distinction, it is then necessary to clarify the relationship between the author of the NFT and the creator of the underlying digital object. Some insights can be gleaned from a wide range of case law, including the Italian litigation decided by an interlocutory injunction order of the Court of Rome,[46] which, while having

[44] G. Vulpiani, n 39 above, 363, on new instances in the face of the legislative gap in the field. B. Sirgiovanni, 'Il non fungible token nella cripto-arte: la 'recinzione' dell'oggetto digitale' *Nuove leggi civili commentate*, 232 (2024); P. Liberanome, 'Criptoarte e nuove sfide alla tutela dei diritti autoriali' *I contratti*, 93 (2022). The work of crypto-art is signed by the artist using their crypto wallet through. A combination of public and private keys, which generates a timestamp and a unique identifier The work is then distributed in the peer-to-peer network and among the various nodes of the network, thereby given a unique code functional for distinguishing its content. This ensures that any work by the artist will always have the same title and will thus accordingly identified by the network. Upon purchase, the token of the work passes from the artist to the wallet of the buying collector. In the case of native analog works, tokenization operates to fragment and securitize a single work into multiple virtual parts, represented by the tokens. There will be as many tokens as there are portions into which the work has been fragmented, and between the crypto-art work and the token there will operate a smart contract, ie, computer protocols that respond to the 'if this, then that' logic. The first experience of tokenization applied to art was in June 2018, when Andy Warhol's (analog) painting '14 Small Electric Chairs' was tokenized on the Maecenas Fine Arts blockchain platform.

[45] B. Sirgiovanni, n 44 above, considers a pronouncement, adopted by a Chinese Court on digital native art. See Hangzhou Internet Court, April 20, 2022, *Shenzhen Qice Diechu Cultural Creation Co., Ltd.* v *Hangzhou Yuanyuzhou Technology Co., Ltd.*, Zhe 0192 Civil First Instance no 1008, available at https://tinyurl.com/ysv6yhks (last visited 31 January 2026).

[46] Tribunale di Roma 20 July 2022, *Rivista di diritto industriale*, 487 (2022), with a note by A. Rainone, 'Tortious use of someone else's trademark on blockchain: the principle of technological neutrality and the missed revolution of distributed ledgers'. Equally famous is the controversy

as its object a trademark dispute,[47] sheds light on some aspects of the legitimacy of token creation. In the case at hand, the court declared the tokenization unlawful in the absence of authorization to use the trademark. As can be seen from the court's argument, the wrongful creation and use of the intangible asset causes both the likelihood of a confused public (led to believe that the representative NFTs come from the same company that owns the trademark) and an undue exploitation of that distinctive sign by the party creating the token. The most significant passage of the ruling, however, concerns the part relating to trademark registration, where it is pointed out that digital protection of the underlying object, precisely by registration, does not also imply registration of the NFT,[48] and it is highlighted that the latter cannot be registered without indication of the underlying digital article. In itself, the NFT contains the link to the underlying object but not proof of legitimacy of its creation under copyright law. This explains the fact that an illegitimate NFT can circulate, even if it lacks the consent of the author or copyright holder, or that it can be created in violation of the terms of the license, or even more that it can be the result of a forgery when the NFT-creator falsely attributes authorship of the work.

While the token's function of certifying the legitimate provenance from the author is not obvious, as we will see more fully below, there does not seem to be any doubt about its representative function in terms of the good: it is apt to identify the underlying digital object,[49] it constitutes the means of identification

between Quentin Tarantino and Miramax that began in 2021 over the sale of NFTs based on the original script of 'Pulp Fiction'. Tarantino had announced the auction of NFTs that included unreleased scenes. Miramax objected, arguing that the auction violated the film company's intellectual property and contractual rights because the rights to the film belonged to the company. Tarantino, in his defence, asserted that the contract allowed him to publish the script, even in the form of an NFT. The dispute highlights the complexity of NFTs and the need to update intellectual property contracts to reflect new technologies.

[47] The matter concerned an application for an injunction by the Juventus football club aimed at preventing any further production, marketing, promotion or offer for sale of NFTs created by the company Blockeras s.r.l. The digital object underlying these NFTs were figurines reproducing the image of a former soccer player, Christian Vieri, wearing the Juventus jersey.

[48] Communication of 23 June 2022 from the European Union Intellectual Property Office, available at https://tinyurl.com/4h9vh4m4 (last visited 31 January 2026): 'The Office is increasingly receiving applications containing terms relating to virtual goods and non-fungible tokens (NFTs). This is the approach that the Office is taking for classification purposes. Virtual goods are proper to Class 9 because they are treated as digital content or images. However, the term virtual goods on its own lacks clarity and precision so must be further specified by stating the content to which the virtual goods relate (eg downloadable virtual goods, namely, virtual clothing). The 12th Edition of the Nice Classification will incorporate the term downloadable digital files authenticated by non-fungible tokens in Class 9. NFTs are treated as unique digital certificates registered in a blockchain, which authenticate digital items but are distinct from those digital items. For the Office, the term non-fungible tokens on its own is not acceptable. The type of digital item authenticated by the NFT must be specified'.

[49] O.T. Scozzafava, *I beni e le forme giuridiche di appartenenza* (Napoli: Edizioni Scientifiche Italiane, 2023), 116-117. The author notes that air can become a good in the legal sense if it is specifically identified, through its compression in a vessel. Therefore, although air is not an typically considered economically relevant and thus not a legal good, it acquires legal status when made identifiable.

of the digital artwork, and it grants a technique of appropriation in an exclusive form of the digital object in a manner that is enforceable against third parties. In this sense, it has been likened to a representative title to goods, within the meaning of Art 1996 Civil Code, which gives to the possessor the right to receive the goods specified therein, a right upon the goods, and the power to dispose of them by transferring the title.[50] In the blockchain, the artistic NFT thus becomes an instrument of certainty in trades, with an advertising or certifying function in a broad sense of the transaction that has taken place and with the possibility of tracing the original acts of disposition.

Given the dissociation between the representative title and the underlying work, it is theoretically conceivable that there will be a conflict between the owner of a good (by purchase, by usucapione, or under the principle 'possession is worth title', Art 1153 Civil Code) and the owner of the NFT related to that specific good (eg a tokenized tangible painting).[51] The issue in this case is not the authenticity of the work but the acquisition of ownership and the certifiable existence of the ownership's right arising from the possession of the token. The problem raises the further unresolved issue of whether the token allows for usucaption or could trigger the rule of acquisition by title of movable property and, ultimately, whether, as mentioned earlier, the token falls under the notion of a thing within the meaning of Art 810 Civil Code.

III. The Problem of Creating Non-Authentic Artistic Tokens

Considering that an NFT can reliably identify the owner of a digital object and trace the blockchain path back to the original act of disposition, it is necessary to assess whether - being a title that represents an artwork – , it also contains sufficient elements to determine whether the underlying object can be attributed to the author. Authenticity is an intrinsic, essential, and inescapable feature of a work of art, and in its absence – or where there are disputes or doubts – the work is not only diminished in economic value, but above all does not correspond to its legal

[50] For a critical view of the assimilation of tokens to credits documents and the potentially different functions of NFTs, see G. Frezza and P. Virgadamo, 'NFT e arte. Alla ricerca di una disciplina giuridica adeguata orientata al principio di verità' *LawArt*, 285-320 (2023). According to the authors, there are, in fact, several types of tokens: a) payment tokens; b) earning tokens; c) funding tokens; d) reward tokens; e) voting rights tokens; f) asset tokens; g) identity tokens. From a token may arise situations classifiable in terms of tangibility, compulsoriness, and associational character, to all of which can be added utility tokens that operate as substantial vouchers related to the provision of services. The legitimation of documents under Art 2002 Civil Code can also describe an NFT, as it can potentially be used to identify the party entitled to the service (the token holder) *vis-à-vis* the issuer, or it can enable the transfer of the embedded right.

[51] G. Frezza and P. Virdagamo, n 50 above, 285; M. D'Onofrio, n 28 above, 81; A. Azara, 'Gli automi nel diritto privato: dal distributore automatico al fenomeno della tokenizzazione' *Foro napoletano*, 323-349 (2022), who sees the circulation of tokens as an implicit exception to Art 1153 Civil Code.

nature. In an exchange relationship, the guarantee of authenticity, besides impacting the value of the delivery, may affect the validity and effectiveness of the contract.[52] In the art market, the traceability of the work to its author and proof of authorship are increasingly relevant in today's global and digital economy.[53] As legal scholars have noted, the issue is both ancient and modern: it concerns the right of authentication and the protection of moral rights tied to authorship.[54] In our system, there is no codified certification system, even though it is referenced in legislation (Art 64 of the Code of Cultural Heritage) and its regulation is fragmented. Current legislation, case law, and common practices regarding authentication make the matter particularly complex, especially in the context of contemporary art. A multiplicity of tools and models exist, from authentication by the artist to expert assessment and certification from artist archives and *catalogues raisonné*.[55] In summary, the topic can be analysed from two basic perspectives: the first concerns who may authenticate and why, while the second concerns the responsibility owed by the authenticating party, including toward third-party buyers.[56]

In light of the above, it is worth examining whether the artistic token, in addition

[52] E. Gabrielli, 'Vendita di opera d'arte, violazione dell'impegno traslativo e nullità del contratto per illiceità del suo oggetto' *Corriere giuridico*, 463 (2013), note to Corte di Cassazione 9 November 2012 no 19509.

[53] G. Frezza, *Arte e diritto tra autenticazione e accertamento* (Napoli: Edizioni Scientifiche Italiane, 2019), 36-64, on the authentication of contemporary and ephemeral work.

[54] G. Frezza, 'Art and Law: authentication and assessment within the Italian legal system' *The Italian Law Journal*, 131 (2022), on the right to authentication: 'this right may be considered as part of the author's moral right and can be exercised by the author himself during his lifetime: pursuant to Art 20 legge no 633 of 1941, in fact, the author can 'claim the authorship of the work and oppose any distortion, mutilation or other modification'; he can also oppose any 'act to the detriment of the work itself' that may cause 'prejudice to his honor and his reputation,' so that he would be the only person entitled to the declaration of authenticity'. On the right to verify authenticity, see M.F. Guardamagna, 'Il diritto all'accertamento giudiziale dell'autenticità dell'opera d'arte, in F. Bosetti ed, *Arte e diritto privato. Teoria generale e problemi applicativi* (Pisa: Pacini editore, 2021), 171.

[55] R. Servanzi, 'Cataloghi d'arte – Cataloghi d'arte e accertamento dell'autenticità' *Giurisprudenza italiana*, 1104 (2023), note to Corte d'Appello di Milano 28 June 2022, with reference to the main opinions in the field concerning actions for verifying authenticity when brought by the owner of an art object against an entity that refused to provide authentication. F. Bosetti, 'Autentiche, perizie, archiviazioni di opere materiali delle arti figurative: verità e responsabilità tra diritto ed arte' *Danno e responsabilità*, 148 (2021); E. Mezzetti, 'Archivi d'artista – Da Fontana, a Bansky, a Haring: archivi d'artista in tribunale' *Giurisprudenza italiana*, 1932 (2020); A. Donati, 'Autenticità, *authenticité*, *authenticity* dell'opera d'arte. Diritto, mercato, prassi virtuose' *Rivista di diritto civile*, 990 (2015).

[56] P. Virgadamo, 'Autenticità dell'opera d'arte e archiviazione: nessun potere di coazione sull'ente certificatore' *Giurisprudenza italiana*, 614 (2022), note to Corte d'Appello di Milano-Sezione specializzata in materia di imprese 4 May 2020. The ruling affirms the judicial authority's power to decide on the genuineness of a contemporary work of art in the case of refusal by a private certifying body to issue a certificate confirming its authorship. The case involved a bronze sculpture that the plaintiff, in the first instance court, asserted was attributable to Lucio Fontana, seeking judicial recognition of such attribution against the foundation bearing his name, which had refused to acknowledge the authenticity of the sculpture. On the judicial establishment of the authenticity of works of art, see again G. Frezza, n 53 above, passim. On civil liability for a refusal to acknowledge authenticity, see M. Mariani, 'La responsabilità civile del critico d'arte', in F. Bosetti ed, n 54 above, 199.

to having an identifying function in respect of the owner of the digital asset, is also suitable for certifying the authenticity of the underlying work, bearing in mind that, traditionally, a certificate of authenticity is understood to be a written attestation of certain characteristics and qualities of the work, authorship, and dating, intended to incontrovertibly link the act of creation to the artist as the owner of the moral and material rights in the work.[57]

Based on an initial examination, especially from descriptions found on the internet – the natural home of the digital art market – an NFT is superficially described as a certificate *tout court*, a secure traceable transfer instrument.[58] In the decentralized system of distributed registries, however, no real control is possible over the legitimacy of the relevant rights or, in general, the veracity of the information contained in the token. It can therefore be doubted whether it qualifies as a certificate of authenticity and asked instead whether – and more realistically – it simply constitutes proof of uniqueness of the associated file, which in turn refers to a digital or physical asset.

To understand how fake or inauthentic digital objects can circulate, it is necessary to briefly outline the procedure for creating an artistic token, during the steps of which the connecting link between the artist and the cryptographic representation of the work may be missing. The tokenization sequence involves a series of technical activities, starting with digitization by scanning or photography, and moving on to the establishment of a wallet compatible with the blockchain chosen for the creation of the NFT. Having identified the platform and connected the crypto-asset wallet, the digital file of the artwork is uploaded.[59] No doubt of authenticity arises where the author himself creates the NFT of his own work, as he owns the copyright. If, however, the rights have been transferred or licensed to another party and that party creates the NFT, the question arises as to whether the token contains digital data verifying the legitimacy of the creation and the attribution of the work. Similarly, if parents or curators create the NFT – in the case of minor authors – does it contain references to legal representation? Does the creation really belong to the children? If the artwork is the result of a collaboration, must it be ascertainable that all co-authors consented to the production of the NFT,

[57] A. Donati, n 55 above, 990.

[58] On the damaging aspects of false, misleading, and unverified news on the Web and on civil law protection against the dissemination of such news, see E. Andreola, 'Fake news e danno da false informazioni in internet' *Responsabilità civile e previdenza*, 1604-1617 and 2000-2016 (2020).

[59] An NFT contains a set of metadata regarding the artwork, including the title of the work, the description and name of the artist, the artwork file, a link to the digital file (image, video, etc.) stored on platforms such as IPFS, and a cryptographic hash. The latter is an alphanumeric value obtained through a function (hash) which transforms an input (eg a digital file) into a series of characters. This process is unidirectional, which means that it is impossible to trace the original input from the hash. It ensures the integrity of the uploaded data and the uniqueness of the digital file, and it makes it possible to quickly and accurately verify the integrity and authenticity of a file. Although an NFT has a unique hash, this does not prevent the unauthorized creation of a duplicate NFT derived from the same digital work.

and does it contain consent from all parties? The questions are of particular relevance and topicality given the proliferation of NFTs, the increase in digital exchanges, and the potential harm to artists, collectors, and art users as consumers.

The basis rests on the technological fact that the token contains metadata entered during upload, and that this data does not necessarily come from the authoring artists. Only some artists issue digitally signed certificates of authenticity. In other cases, to recognize the falsity of NFTs, it is not enough to check the transaction history on the blockchain. An analysis of the content of the uploaded files is necessary since the metadata can be manipulated and may not correspond to the original work. Fake content creators can exploit the open and decentralized features of blockchain technology and NFT platforms, as well as all open resources on the net.[60] Digital artworks are often posted online for public viewing, so they can be easily downloaded to create NFTs. Some crypto-art platforms do not require rigorous verification of the identity of the users creating the tokens, nor do they demand proof of authenticity or ownership of the artwork, with the result that anyone with basic technical skills can register a fake account (eg using the name of a famous artist) and proceed with tokenization.

In light of these considerations, the vulnerabilities of the digital art market becomes apparent, and the mere possibility of fake NFTs being in circulation leaves existing blockchain technology exposed.[61] In the absence of regulation of a still-developing phenomenon, technology lends art its first forms of protection.[62] Some marketplaces require verification of artists' identities and check the authenticity of works. Platforms such as OpenSea, Rarible, and others are increasing verification processes for artists, requiring proof of identity and ownership of works. Detection tools such as algorithms that flag suspicious or copied content are becoming more

[60] On the possibility of the net user also becoming a perpetrator of a tort, see E. Andreola, n 58 above, 1613-1614. According to C. Trevisi et al, n 38 above, 340, 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 are true.

[61] V. Lisanti, 'NFT e (mercato dell') arte: analisi e criticità del nuovo collezionismo digitale' *Parolechiave. Nuova serie di "Problemi del socialismo"*, 183 (2023). Famous cases of court litigation show that the NFT market, despite its promises of transparency and traceability, is still prone to problems of fraud, counterfeiting, and litigation. In the 2022 case *Hermès* v *Mason Rothschild*, Hermès sued digital artist Mason Rothschild over the sale of NFTs called 'MetaBirkins' (inspired by Hermès' famous Birkin bag), claiming that these NFTs infringed on their registered trademarks and constituted unfair competition and intellectual property infringements. In 2021, a group of artists Artistas de México sued the OpenSea platform accusing it of allowing the sale of counterfeit artworks as NFTs. The artists had claimed that their works were uploaded and sold on OpenSea without their consent, causing reputational damage and loss of profits. For doubts about the authenticity of artistic NFTs, see L.M. Seri, 'NFT e arte: lo stato delle regole su autenticità e diritti d'autore', available at https://tinyurl.com/36fy684v (last visited 31 January 2026). The author points out that NFTs do not include the associated work nor, automatically, copyright. Therefore, it is necessary to dispel misconceptions and to more accurately determine the actual scope of the tool. He also addresses the integration of metadata through smart contracts.

[62] On technological protection systems and the consideration that they, in turn, are hackable, see C. Sandei, n 37 above, 194.

widespread. These are preventive technological measures designed to reduce copyright infringement, but they are not sufficient to exclude illicit content from being created and disseminated through the circulation of art tokens, causing serious harm to authors, users, and buyers. In the absence of specific regulation, the remedies will be no different from those generally available for online torts on compensatory, precautionary, and injunctive levels, thereby adding a new and very complex dimension to our investigation.[63]

IV. Doubts about Smart Contracts as a Tool for Copyright Protection

Among the technological systems of copyright protection intrinsic to blockchain, smart contracts are often referred to as automated tools facilitating the circulation of NFTs on platforms.[64] The idea that such a computerized contractual medium, to which we will return shortly, constitutes a digital protection measure[65] is closely linked to the widespread belief in the authentic value of a token, which, however, can be doubted for the reasons just stated. If, as we have tried to show, it is possible to find NFTs on the net that cannot be legitimately referred to the author, it is necessary to examine whether – and how – a smart contract, operating through the blockchain, can be designed to ensure the authenticity of the embedded negotiated art object, considering all the data it contains.

Before addressing this issue, a brief reflection on the nature and function of smart contracts, especially when the contractual relationship fails. It is known that a smart contract consists of a computer protocol aimed at making instantaneous and automatic transactions, along the lines of mechanical dispensers, executed through an algorithm and according to the structural rule *if this, then that*. The legislative definition unveils the evidentiary value of the digital transaction as it expressly fulfils the requirement of a written form, after computer identification of the parties involved, through a process complying with the requirements set by the Agency for

[63] On the structure of tort on the Web, E. Andreola, *Minori e incapaci in internet* (Napoli: Edizioni Scientifiche Italiane, 2019), 243; Id, 'Misure cautelari a tutela dei minori nei social network' *Famiglia e diritto*, 849 (2021).

[64] G. Vulpiani, n 39 above, 363, on the definition of a smart contract: 'a computerised transaction protocol that executes the terms of a contract at the fulfilment of preset conditions. Through the blockchain, the unchangeability and automatic execution of the computer code of the smart contract is guaranteed. The term smart contract was coined by Nick Szabo'; C. Sandei, n 37 above, 194; P. Liberanome, n 44 above, 93; G. Frezza and P. Virgadamo, n 50 above, 285-320.

[65] M. Travostino, 'Le misure tecnologiche di protezione e la gestione dei diritti nell'ambiente digitale' *Giurisprudenza italiana*, 2193 (2011); G. Finocchiaro, 'Misure tecnologiche di protezione e informazioni elettroniche sul regime dei diritti' *Annali Italiani del Diritto d'Autore, della Cultura e dello Spettacolo*, 280 (2000). Art 102-*quater* legge 22 April 1941 no 633 on Copyright defines TPMs (an acronym from the English expression technologic protection measures) as all technologies, devices or components which, in the normal course of their operation, are intended to prevent or limit acts not authorized by the right holders; the provision enshrines the rights of copyright and gives related rights holders and database right holders the power to affix effective technological protection measures to protected works or materials.

Digital Italy, with the result that the telematic act can be given the same evidentiary effect as any other computer document registered with an affixed digital signature.[66] Control over the existence of the conditions for self-execution of the smart contract can be entrusted to the blockchain itself or to so-called oracles, programs outside the chain that ascertain the fulfilment of the conditions stipulated in the contract. As anticipated, once implemented into the blockchain, the smart contract becomes unchangeable and irrevocable. The system automatically executes the performance, making the negotiated clauses self-executing, according to the aforementioned *if this, then that* principle.[67] From our perspective of investigation, it should be emphasized that the mechanism precludes the very possibility of default and that the party does not have the ability to suspend performance in the face of another's default, the implementation of the negotiation program being subject only to the occurrence of certain events programmed and verified by the software.

The particularity of smart contracts has famously cast doubt on their contractual nature.[68] Assuming they qualify as contracts, considering that the basis of a

[66] Decreto legge 14 December 2018 no 135 defines a smart contract as a computer program that operates on distributed ledger-based technologies and whose execution automatically binds two or more parties based on effects predefined by them. G. Finocchiaro, 'Artificial Intelligence and the Protection of Personal Data' *Giurisprudenza italiana*, 1670 (2019), highlights two critical issue regarding the inadequacy of the legislation; first, by attempting to define blockchain technology and its application to smart contracts, it ends up crystallizing these concepts in their current shapes, which is at odds with the internationally established principle of technological neutrality; second, the definition provided is not aligned with the general rules governing the form and validity of a digital document. On the insufficiency of legislative definitions and the absence of a minimally organic treatment of the topic, see V. Bellomia, 'The smart contract: issues of civil law' *Judicium*, 10 December 2020, 1-28.

[67] Numerous academic articles clarify and highlight inconsistencies of smart contracts' operation with the civil law system. See, among others, M. Maugeri, *Smart contracts e disciplina dei contratti - Smart contracts and contract law* (Bologna: il Mulino, 2021), 21; A. Gambino and A. Stazi, 'Contract Automation from Telematic Agreements to Smart Contracts' *The Italian Law Journal*, 107 (2021); V. Bellomia, n 66 above; M. Giaccaglia, 'Considerazioni su blockchain e smart contracts (oltre le criptovalute)' *Contratto e impresa*, 941 (2019); P. Cuccuru, 'Blockchain ed automazione contrattuale. Riflessioni sugli smart contract' *La nuova giurisprudenza civile*, 107 (2017). About the relationship between smart contract and copyright, see A. Bacholkar et al, 'Design and develop certificate validation system using smart contract' *International Journal of Engineering Applied Sciences and Technology*, 549 (2020).

[68] Given the broad and non-univocal formulation of the concept of smart contract, it is key to clarify that, despite its name, it does not necessarily include only contracts. It can, in fact, also cover the execution of protocols entirely unrelated to the negotiations between parties, such as, for example, an algorithm regulating indoor temperature of a home in response to external weather changes. We also speak of smart contracts for those contracts that are entered into or executed algorithmically, with limited interaction between the parties, as in the case (from which Nick Szabo's own smart contract idea originated) of the vending machine contracts associated with these devices. The scholarly debate that has arisen regarding the characterization of automatic and telematic contracts is well known and relates to the question of whether one can verify the applicability of traditional civil law categories and instruments of protection when the contract fails or malfunctions. On the discussion between contractualists and a-contractualists, see essentially N. Irti, 'Scambi senza accordo' *Rivista trimestrale di diritto processuale civile*, 362 (1998), according to whom, in a contract concluded through a telematic medium, the exchange does not result from an

transaction is always and in any case the consent of the parties[69] – consent that includes a willingness to use an algorithm and to accept the results to which it arrives – and considering that the choice of a digital instrument pertains to the form of the contract as the means of a negotiated declaration, a smart contract can be considered an act of private autonomy, requiring awareness not only of the legal instrument used but also of the effects of the contractual rule.

It has been effectively pointed out that, given the automatic nature of performance and the impossibility of stopping it, smart contracts are preferable as they eliminate the problems of another's default.[70] The question arises, however, as to whether there is equal awareness of the utility of the choice in the event that the non-performance of the counter-performance is discovered while waiting for the (scheduled) occurrence of one's own performance. The issue represents one of the most critical aspects concerning smart contracts, and possible solutions, while they can draw on traditional civil law categories insofar as they are compatible,[71] require appropriate adjustments to the surrounding legal mechanisms. To justify

agreement, that is, from the congruence of statements addressed by one party to the other, but from acts addressed to the thing and inscribed in a market system; G. Oppo, 'Disumanizzazione del contratto?' *Rivista di diritto civile*, 525 (1998). On the value of consent in mass contracts, see C.M. Bianca, 'Acontrattualità dei contratti di massa?' *Vita notarile*, 1120 (2001), who, criticizing the 'sterility' of the thesis of contracts without agreement, states that agreements can be concluded even without speaking and that the use of speech is still not worth changing the nature and substance of a contract. The particularity lies in the form of the negotiating statement constituted by the telematic deed. On this issue, see the clarification of S. Patti, *Diritto privato e codificazioni europee* (Milano: Giuffrè, 2007), 136, according to whom what is hardly found in the modern market – and what tends to disappear – is the holding of negotiations, so one should speak not of exchanges without agreement but of exchanges without dialogue. The concept is taken up with regard to smart contracts by G. Castellani, 'Smart contracts e profili di diritto civile' *Comparazione e diritto civile*, 1-14 (2109), who speaks of agreements that are without dialogue but that are rich in language (informatics, we would say).

[69] The term smart legal contract emphasizes that the transaction is not just a program that automatically executes certain conditions, but also an agreement having legal validity and binding force between the parties. The configuration of the smart contract as a contract is motivated by the need to identify means of protecting the contracting parties. According to another approach, the smart contract is merely a channel for the conclusion and management of agreements, rather than an agreement itself. A. Santosuosso and S. Azzini, 'Legal design e contratto: un nuovo sviluppo o un'alternativa?' *I Contratti*, 465 (2022); M. Giaccaglia, n 67 above, 941. Disputing characterization as a contract, see, for example, A. Spatuzzi, 'Algoritmi e automazione: la notte del contratto?' *Notariato*, 406 (2023); R. Pardolesi e A. Davola, 'Smart contract: lusinghe ed equivoci dell'innovazione purchessia' *Foro italiano*, 195 (2019); A. Caggiano, 'Il contratto nel mondo digitale' *La nuova giurisprudenza civile*, 1154 (2018), according to whom smart contracts, although not contracts in the legal sense, can integrate acts of the contractual event, when algorithms are programmed to manage some phases of the contract.

[70] C. Attanasio, 'Inadempimento dello smart contract, sistema rimediale e tutela effettiva' *Rivista di diritto civile*, 719 (2024); B. Sirgiovanni, 'Lo smart contract e la tutela del consumatore: la traduzione del linguaggio naturale in linguaggio informatico attraverso il legal design' *Le nuove leggi civili commentate*, 214 (2023).

[71] N. Lipari, *Le categorie del diritto civile* (Milano: Giuffrè, 2013), 182, on invalidity linked no longer to the act but to the relationship and the relationship between old and new legal categories in the contract.

the *if-then* process from a legal perspective, it has been observed that a condition is created similar to that resulting from the insertion of a clause limiting the right to propose exceptions (Art 1462 Civil Code).[72]

Let us test the effectiveness of this notion in respect of a hypothesized sale of unauthenticated digital (or digitized) artwork. The approach – according to which the *if-then* principle entails a limitation of the buyer's defence by exception to prevent or delay its own performance – would in our case entail a prior waiver of the right to object to either copyright infringement or a breach of the obligation to ensure the conformity of the good. By acceding to the rigid system of the smart contract, the buyer would be abdicating the right to authenticity, understood as the right to certainty regarding the authorship of the work, at the stage of performance, accepting that he or she would have to remain inert in the face of the infringement of a plurality of interests in a system in which the rights of art are relevant not only on the private but also on the public level.[73] On closer analysis, therefore, the scheme of a clause limiting the availability of exceptions, read also in light of the exclusions in the last part of the first paragraph of Art 1462 Civil Code (the clause has no effect in cases of nullity, voidability, rescission), does not seem applicable to legitimize a smart contract in the case of a sale of artistic goods.[74] In fact, in the event of non-genuineness of the work, there looms the illegal situation of a contract that requires prior acceptance and the waiver of a party's means of self-protection, thereby also constituting the possible violation of mandatory rules prescribed to protect art as a manifestation of the author's right and as an expression of the artist's personality. The genuineness of a creative work is a protected asset in the interest of the community, so much so that an art dealer's failure to satisfy the obligation to provide the buyer with documents certifying authenticity under Arts 64 and 164 Code of Cultural Heritage is expressly sanctioned with the nullity of the contract.[75]

[72] D. Di Sabato, 'Gli smart contracts: robot che gestiscono il rischio contrattuale' *Contratto e impresa*, 378 (2017); V. Bellomia, n 66 above.

[73] G. Frezza, *Arte e diritto* n 53 above, 17; Id, , 'Art and Law' n 54 above, 131, on the right to authentication (verification of authenticity) and the constitutional basis for protection of the authenticity of artwork.

[74] Art 1462 Civil Code explicitly identifies a set of exceptions known as non-deferrable exceptions (such as nullity, voidability, and rescission), as they pertain to the 'genetic' profile of the contract and relate to particularly serious defects. See Annotated Civil Code, available at www.leggiditalia.it, *sub* Art 1462, edited by M. Benincasa, updated by B. Sirgiovanni.

[75] On the defect of a contract of sale of an unauthenticated work, see the case decided by the Tribunale di Vicenza on 16 February 2016, available at www.leggiditalia.it. In that case, a person had purchased from an antiquarian store a painting bearing the signature of an author. Later, having submitted the work for an expert's appraisal, the buyer learned that the painting was not attributable to the author and was therefore of much lower value. However, rather than being annulled because of a defect of will or because of the delivery of a good of a different kind from that promised, the sale was declared void for violation of a rule of law, independent of the question of the non-authenticity of the painting. The starting point of the court's analysis was Art 64 of decreto legislativo 22 January 2004 no 42 (Code of Cultural Heritage and Landscape) on the seller's obligation to deliver to the buyer documentation attesting to the authenticity or at least the probable attribution and provenance of the works themselves. Considering that this is a rule responding

Even if one does not want to consider a case of nullity because of unlawfulness, there seems to be no doubt that the buyer's consent is vitiated by an error in the identity and essential quality of the digital artistic object or that, regardless of the recognizability of the error, there is a decisive deceptive activity of the tokenizer (who created the false token) such that the contract is voidable for fraud.[76] In the envisaged cases of invalidity (nullity or voidability), as is well known, a scheme corresponding to the (blocking) clause limiting the availability of exceptions could not operate. The insensitivity of the smart contract to the absence of legal conditions due to the non-authenticity of the object in question should consequently be considered incompatible with the provision of the Civil Code and in general within the system of protection of artistic property. The inability, as programmed by an algorithm, to react with a suspension of performance in response to a purchase of non-authentic artwork would not comply with legal requirements, and we would be faced with an illegal smart contract. Nor, as it has been extensively pointed out, could the consumer's right to withdraw automatically apply, since the very structure of the blockchain does not include any links in the chain providing the space to withdraw, unless a particularly enlightened contract can be designed that postpones automatic performance until the expiration of the deadline for exercising the right of withdrawal.[77]

not only to the interests of the private buyer but also to the public interest in the preservation of cultural heritage and the fairness of exchanges in the art market, the court sanctioned the ambiguity of the situation with the nullity of the sale. See also the case referred to in the order of the Tribunale di Firenze of 20 April 2023, *Foro Italiano*, 2257 (2023). There, a magazine had used on its cover the image of Michelangelo's David juxtaposed – using a lenticular technique – with that of a model, despite the fact that the Director of the Galleria dell'Accademia had authorized its use only on condition that the image was not altered. In a case brought by the Ministry of Cultural Heritage and Activities for Tourism, the court affirmed that, like the right to the image of the person, a right to the image of cultural property can also be identified under Arts 107 and 108 of decreto legislativo no 42/2004, which constitute norms directly implementing Art 9 of the Italian Constitution. On this basis, the unauthorized reproduction must be compensated in both patrimonial and non-patrimonial aspects. Criticizing the scope of Art 64 of the Cultural Heritage Code in relation to the invalidity of the contract, see G. De Cristofaro, 'La tutela degli acquirenti di opere d'arte contemporanea non autentiche tra codice civile, codice del consumo e codice dei beni culturali' *Rivista di diritto privato*, 29 and particularly 62 (2020).

[76] G. Vulpiani, 'Circolazione di opere d'arte non autentiche e rimedi civilistici' *Rassegna di diritto della moda e delle arti*, 24 May 2024. G. Magri, 'Falsa o erronea attribuzione di opera d'arte e rimedi contrattuali' Rassegna di diritto della moda e delle arti, 4 May 2023, focuses on the additional remedy of a contract that does not conform with legal requirements.

[77] G. Frezza and P. Virgadamo, n 50 above, 285-320; D. Di Sabato, n 72 above, 378, according to whom protocols must be written in a way that fulfils information obligations and grants the consumer the right of withdrawal. V. Bellomia, n 66 above, points out that, for the purpose of the right of withrdrawal, the smart contract will have to be programmed so that the execution of the contract takes into account the period of time in which the consumer is entitled to exercise the right of withdrawal, possibly resulting in automatic execution only after the expiration of the period. A further difficulty could arise from the problem of identifying and distinguishing between parties acting as consumers or professionals in public blockchains. On the application of ancillary contractual elements and particularly the conditionality of smart contracts, see G. Marchetti, 'Lineamenti evolutivi della potestatività condizionale: dal contratto allo smart contract' *Rivista*

Within this framework of critical considerations, the question left open as to whether smart contracting is really a smart idea[78] could be answered by observing that this depends on the competence, good faith, and fairness of those who translate legal rules into computer language, and on whether the construction of the algorithm actually allows the *if-then* scheme to be disabled when (a) there is a violation of mandatory rules, such as those on copyright protection; (b) the regulatory system of art protection as inspired by the principle of truth; (c) transparency in the protection of super-individual interests.[79]

In conclusion, in the case of smart contract purchase of art tokens, the operative algorithm cannot in and of itself certify the authenticity of an artwork (a certification that requires a combination of technological and human verification). The token will be able to store and automate some aspects of this process, but cannot function as a verification tool, as it is not capable of detecting fraud or forgery and self-suspend the transaction.[80] It follows that if the initial information is false or fraudulent, the smart contract, which is structurally disconnected from reality, will execute irreversibly to the detriment of both the buyer and the author of artwork. The judgment regarding the inherent unfitness of the medium does not change in view of the protection offered by the law, following the execution of the contract, on the compensatory and restitutionary levels.[81]

Hence, a number of interim conclusions are in order.

The only form of self-protection in the crypto-art market is to have knowledge of the metadata loaded into the token and to verify, from time to time, the authorship of the digital object. In the absence of computer expertise and a facility with cryptographic language allowing for an examination of digital information about the author of the work, refraining from the use of blockchain technology appears

di diritto civile, 96 (2022).

[78] M. Giancaspro, 'Is a Smart Contract Really a Smart Idea?' *Computer Law & Security Review*, 1 (2017); P. Sirena and F.P. Patti, 'Smart contracts and automation of private relationships' *Bocconi Legal Studies Research Paper no 3662402*, 28 July 2020, available at https://tinyurl.com/yduhzm2r (last visited 31 January 2026), according to whom, '(i)t is often argued that 'smart contract' is a misnomer as the 'smart' part of the contract in reality affects only the performance. In addition, smart contracts are not intelligent, but rely on an 'If-Then' principle, which means, for instance, that a given performance will be executed only when the agreed upon amount of money is sent to the system'.

[79] The principle of truth permeates our legal system: from contractual relationships, where the duty of transparency and correctness of information affects the self-determination of the parties and thus the validity of the contract; to filiation relationships, where the right to know of a genetic bond is protected regardless of the establishment of a social or adoptive filiation relationship (E. Andreola, 'Il principio di verità nella filiazione?' Famiglia e diritto, 88 (2015)); to art, as highlighted by Giuseppe Vettori in the seminar entitled 'La verità in pittura' held in Florence, Villa Ruspoli, 24 March 2023, poster available at https://tinyurl.com/mr3ze2bn (last visited 31 January 2026) (see also G. Vettori, 'Seeking Truth in Law. First notes' *Person and Market*, 407-412 (2023). See F. Bosetti, 'Autentiche, perizie, archiviazioni di opere materiali delle arti figurative: verità e responsabilità tra diritto ed arte' *Danno e responsabilità*, 148 (2021); on the effectiveness of legal language, Id 'Il diritto ad un rimedio effettivo nel diritto privato europeo' *Rivista di diritto civile*, 3 (2017).

[80] D. Fauceglia, 'Il problema dell'integrazione dello smart contract' *I Contratti*, 591 (2020).

[81] G. Vulpiani, 'Circolazione di opere d'arte' n 76 above.

to be a form – albeit an extreme form – of self-defence.

If, however, in light of these risks, the result is that the parties who can safely trade on the Web through NFTs are limited to users capable of understanding the field's technical terminology, it is necessary to reflect on the potential segregating effect of blockchain technology, as it will tend to isolate the average Web user who, although interested in the digitized art market, is not capable of understanding all its contents so as to manifest informed consent. A kind of third-level digital divide is in fact looming, one related to the functionality of cryptographic algorithms.[82]

It thus seems difficult to reconcile this limiting effect with the expectations of the digitization of art discussed at the beginning of this analysis. Indeed, as pointed out, the advent of new digital technologies has entailed an exceptional means of promoting and circulating creative works. However, the new buying and selling channels and the new digital tools representing art are targeted at a more experienced user audience that is capable of using a much more complex computer and information language, ultimately creating discrimination among potential buyers.[83]

V. Conclusions

Digital innovation is having an increasing impact on the art sector. The latest technologies have led to the reshaping of the artistic experience by affecting both the creative act and the circulation of the work. The phenomenon of digitization of art is expressed not only through the creation of natively digital artworks or the conversion of physical works into digital files, but also in its placement in the virtual marketplace.

The use of such technology, within the globalized structure of the internet,

[82] The digital skills gap represents an effect related to the development of communication technologies and creates inequality between those who have effective access to such technologies and those who remain excluded. On the various levels of digital divide, see A. Tironi, 'I tre livelli del digital divide' *Associazione Cittadinanza Digitale*, 19 May 2023, available at https://tinyurl.com/48u5jtx3 (last visited 31 January 2026); T. Pucci, 'Il diritto all'accesso nella società dell'informazione e della conoscenza. Il digital divide' *Informatica e diritto*, 121-155 (2022). The third level of the digital divide essentially arises from the spread of artificial intelligence tools. The widespread adoption of these technologies can create new inequalities related to the understanding and use of the new means. According to E.W. Di Mauro, n 34 above, 118, the technical-digital inexperience of most contracting parties entails that the negotiation and drafting of smart contracts necessarily require not only the collaboration and participation of persons able to write and read algorithms but, in the case of operations on blockchain, also the ability to manage the operation of such a network and to bear the relative costs.

[83] According to O. Pollicino, 'Copyright versus Freedom of Speech nell'era digitale' *Giurisprudenza italiana*, 1944 (2011), technological innovation is a vehicle for the dissemination of creative works that theoretically fosters a broadening of knowledge and greater sharing of content; however, such circulation can end up being a deterrent to undertaking creative endeavours insofar asthe evolution occurs in defiance of those copyright rules intended to do the opposite - namely to incentivize acts resulting in original and creative work through the granting of economic compensation.

ends up affecting the right of access to art, expanding the possibilities of knowledge, enjoyment, preservation, and economic exploitation. It has been widely emphasized that the online dissemination of creative works constitutes an opportunity for users to exercise with greater freedom their subjective right to culture and art as a common good.

Objectively speaking, digital art trade presents the novelty of trading in intangible assets consisting of files containing combined and reprocessed information – that digitally represent the artwork – in acts of online disposition. When digital art assets are uploaded to dedicated blockchain platforms, digital art becomes crypto-art and uses non-fungible tokens (NFTs) to identify and track transactions in the marketplace. Although artistic NFTs are often described as tools for identification, authentication, protection, and sale of artworks, they do not always contain sufficient information to allow an unequivocal attribution of authorship; and smart contracts, as automated transfer mechanisms, are not sufficiently smart to prevent the circulation of fake works and to protect copyright.

Finally, the cryptographic language of the new art circulation tools is highly selective, requiring more substantial computer skills and content understanding than those of the average net user. Consequently, contrary to the aspiration of the art digitization phenomenon to foster greater cultural participation, the technological transformation of art ends up creating a digital divide and market exclusion for the newly digitally incapacitated.