

# DEBUTS

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## *Deus ex machina?* NFT Technology as a Means of Preservation for Endangered Cultural Heritage

**Abstract:** This article discusses NFT technology in the context of cultural heritage protection in armed conflicts, addressing both the benefits and challenges that come with their use. In view of the recent example set by the Kharkiv Art Museum, a cultural institution that has digitized 15 artworks to be sold in an auction and whose incomes will contribute to the preservation of national cultural heritage, the present study will delve into both the legal and ethical aspects underlying what is known as NFTs, shedding light on their possible protection under the existing cultural heritage framework. To this end, the provisions enshrined in the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict and its Protocols will be examined.

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**Keywords:** NFT, armed conflict, 1954 Hague Convention, cultural heritage protection

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## Introduction: The Loss of the “Aura”

While still largely unknown to the general public, it is undisputed that nowadays the realm of digital transformation also constitutes a core part of modern cultural heritage. However, despite its slow but steady rise, digital cultural property still poses a challenge for legislators from every corner of the world in terms of its applicable protection – and the same can be said for international law.

While under the law of armed conflict states are required to safeguard cultural property from harm, the provisions designed to apply to traditional cultural heritage may not be suitable to protect digital works. By way of example, it is a matter of contention whether the obligations set out in the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict,<sup>1</sup> apply to digital creations – and, more importantly, which works are deemed to be worthy of such protection.<sup>2</sup>

This topic, however, is not new to art literature; quite the contrary, one of the earliest writings on this very subject dates back almost a hundred years. Notably, what had raised concerns was the cultural value of replicated works: prior to the advent of digital change, new technologies such as photography were the subject of Walter Benjamin’s analysis and marked the beginning of the “Age of Mechanical Reproduction”, as he memorably described it. Benjamin maintained that a copy of a unique work of art, even a “perfect reproduction”, cannot match the original’s “authenticity” and “aura”. According to the German critic, an original work, when compared to its duplicates, always retains a level of authority that cannot be obtained by means of reproduction. He further elaborated on the reasons behind this statement, explaining that mechanical replication can place copies in different settings, implying that the context alters the perception of the object – i.e. its “aura”, as previously mentioned. The aura of a mere copy cannot therefore be compared to the original, because it lacks the original’s presence in time and space.<sup>3</sup>

From a modern perspective, artworks are now frequently placed in different locations than their original context; i.e. as in cases of loans between museum institutions. This new established reality and Benjamin’s ideas could represent an opportunity to provide new insights into the present-day international legal framework governing the protection of cultural heritage in armed conflict.

The ongoing conflict in the Ukrainian territories can serve as a point of departure for the present study – more specifically, the Kharkiv Art Museum’s ini-

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<sup>1</sup> 14 May 1954, 249 UNTS 240.

<sup>2</sup> D. Gillman, *Preserving Valuable Objects and Sites, in Times of War and at Other Times*, in: C. Finkelstein, D. Gillman, F. Rosén (eds.), *The Preservation of Art and Culture in Times of War*, Oxford University Press, Oxford 2022.

<sup>3</sup> In the author’s words, “even the most perfect reproduction of a work of art is lacking in one element: its presence in time and space, its unique existence at the place where it happens to be”. W. Benjamin, *The Work of Art in the Age of Mechanical Reproduction*, Penguin Books, London 2008, p. 11.

tiative to preserve its own collection in a truly innovative way.<sup>4</sup> For the past two years, Russian missile attacks in Ukraine have been causing major damages to cultural heritage sites, universities, and museums.<sup>5</sup> In this context, cultural institutions in Ukraine have struggled to find new ways to protect their heritage. In order to raise funds for the preservation of national sites, the Kharkiv Art Museum has launched an original NFT art collection: during the temporary withdrawal of Russian troops from the city, the local museum digitized 15 works of art to form the “Art Without Borders” collection, the proceeds of which will be used to help safeguard the national cultural heritage.<sup>6</sup> Besides generating a significant revenue for the museum, the stated purpose of this campaign is ensuring the conservation of art that, once converted into NFT, cannot be destroyed: therefore, in the event of their loss during the military attacks on the city of Kharkiv – which is considered to be a crucial military target by Russian forces<sup>7</sup> – the digital existence of the artwork could be secured by its recording on the blockchain.<sup>8</sup>

However, when a physical cultural object is represented by the NFT, “the content is primarily the metadata (i.e. a description of the object’s specifications) of the asset (e.g. title, author, dimensions; [...])”,<sup>9</sup> while any image portraying the artwork associated with the NFT has “a purely descriptive function in order to sell the NFT itself and is not part of the content”.<sup>10</sup> In light of the above, the application of blockchain to cultural goods can act as an information management system. Nevertheless, its contribution to the preservation of the artwork can still be debated.<sup>11</sup>

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<sup>4</sup> Heritage Research Hub, *The Kharkiv Art Museum, in Ukraine, Launches a NFT Collection to Support Ukrainian Cultural Heritage*, <https://www.heritageresearch-hub.eu/the-kharkiv-art-museum-nft-collection-to-support-ukrainian-cultural-heritage/> [accessed: 29.06.2024].

<sup>5</sup> As stated on UNESCO’s website: “As of 12 June 2024, UNESCO has verified damage to 412 sites since 24 February 2022 – 137 religious sites, 201 buildings of historical and/or artistic interest, 31 museums, 27 monuments, 15 libraries, 1 archive”. The entire list is available at <https://www.unesco.org/en/articles/damaged-cultural-sites-ukraine-verified-unesco> [accessed: 29.06.2024].

<sup>6</sup> The art collection in question is available on the Binance NFT marketplace. More information on the artworks at <https://www.binance.com/en/nft/profile/kharkivartmuseum-dca3bb58afafaa91fce557f48e8c6c74> [accessed: 29.06.2024].

<sup>7</sup> Proven also by the recurrent attacks on the city; see, for example, M. Santora, *Ukraine Urges Allies to Allow Their Weapons to Target Russian Air Power*, “The New York Times”, 23 June 2024, <https://www.nytimes.com/2024/06/23/world/europe/ukraine-war-zelensky-us-weapons.html> [accessed: 29.06.2024].

<sup>8</sup> This is clearly stated on Binance’s page about the ongoing auction: <https://www.binance.com/en/blog/nft/ukrainian-museum-auctions-nft-collection-on-binance-in-support-of-ukrainian-cultural-heritage-2728861615352904387> [accessed: 29.06.2024].

<sup>9</sup> K. Garbers-von Boehm, H. Haag, K. Gruber, *Intellectual Property Rights and Distributed Ledger Technology with a Focus on Art NFTs and Tokenized Art*, October 2022, p. 11, [https://www.europarl.europa.eu/RegData/etudes/STUD/2022/737709/IPOL\\_STU\(2022\)737709\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2022/737709/IPOL_STU(2022)737709_EN.pdf) [accessed: 29.06.2024].

<sup>10</sup> Ibidem.

<sup>11</sup> V. Giannoulis, G. Kapellakou, *Blockchain and Illicit Trafficking in Cultural Goods*, “Santander Art and Culture Law Review” 2023, Vol. 9(2), pp. 117-142.

Returning to the concept of “aura”, as previously mentioned, Benjamin argues about the value of the work of art in relation to its environment. Mechanical reproduction works in the perspective of what critics call “exhibition value”, which separates art from its previous “cult value”: while the artwork used to fulfil a certain role in relation to its setting, its function has nowadays changed thanks to the “reproduction” technology. To sum up, in exchange for the “aura” that used to be attached to the original artwork, art has progressively become more accessible to the general audience.<sup>12</sup>

The purpose of this article is therefore to discuss the impact of NFTs on the existing cultural heritage protection agendas, in view of the precedent set by the Kharkiv Art Museum. Therefore, following a brief presentation of the relevant international legal framework and a short explanation regarding NFT technology, this article discusses their adherence to the current laws on the protection of cultural heritage during armed conflict, followed by some concluding remarks.

## Cultural Heritage Law in the Context of Armed Conflict and the Digital Realm

While the Lieber Code succinctly attempted, through Articles 34 and 35, to provide protection for cultural property in armed conflict,<sup>13</sup> this thorny issue was later addressed in the Hague Regulations of 1907, which provide that “all necessary steps must be taken to spare” cultural assets in the event of aerial, land, or marine bombardment during an armed conflict.<sup>14</sup> However, the widespread destruction of cultural heritage during the Second World War demonstrated the inadequacies of the legal regime, resulting in the approval, in 1954, of the Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict.<sup>15</sup> Widely regarded as the cornerstone of the subject in question, its provisions are largely thought to

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<sup>12</sup> W. Benjamin, op. cit., p. 20.

<sup>13</sup> The Lieber Code can be freely accessed online through the International Humanitarian Law Database: <https://ihl-databases.icrc.org/en/ihl-treaties/liebercode-1863> [accessed: 16.09.2024]. Moreover, the notion that a certain class of objects should be protected as cultural property was already evident in the writings of Renaissance authors, as assessed in C. Ehler, *Prosecuting the Destruction of Cultural Property in International Criminal Law*, Martinus Nijhoff Publishers, Leiden–Boston 2014, pp. 16–23.

<sup>14</sup> Convention (IV) respecting the Laws and Customs of War on Land and its Annex: Regulations Concerning the Laws and Customs of War on Land, 18 October 1907, 205 CTS 277, Art. 27 (“In sieges and bombardments all necessary steps must be taken to spare, as far as possible, buildings dedicated to religion, art, science, or charitable purposes, historic monuments, hospitals, and places where the sick and wounded are collected, provided they are not being used at the time for military purposes”); Convention (IX) concerning Bombardment by Naval Forces in Time of War, 18 October 1907, 205 CTS 345, Art. 5 (“In bombardments by naval forces all the necessary measures must be taken by the commander to spare as far as possible sacred edifices, buildings used for artistic, scientific, or charitable purposes, historic monuments, hospitals, and places where the sick or wounded are collected, on the understanding that they are not used at the same time for military purposes”).

<sup>15</sup> F. Francioni, *Cultural Heritage*, in: *Max Planck Encyclopedia of Public International Law*, 2008.

mirror customary international law.<sup>16</sup> It has since been expanded with two optional protocols, whose aim was to clarify core elements of the treaty, such as the concept of “military necessity”, which “permits a belligerent, subject to the laws of war, to apply any amount and kind of force to compel the complete submission of the enemy with the least possible expenditure of time, life, and money”.<sup>17</sup> By referencing other sources of international law, the Protocol further develops the definition enshrined in the 1954 Hague Convention that obligated states, in order to protect cultural property, to refrain from their use when they would likely be damaged or destroyed, and only allows it in “exceptional cases of unavoidable military necessity”.<sup>18</sup> According to the updated provision, posing such a risk to cultural property could only be deemed acceptable “when and for as long as no choice is possible between such use of the cultural property and another feasible method for obtaining a similar military advantage”.<sup>19</sup> In addition to the notion of imperative military necessity, the first part of the same article deals with the permissibility of directing an act of hostility against cultural property, limiting any attack to two conditions: first of all, rather than the inherent nature of the property in question, it is the function that said good covers in the circumstances prevailing at the time that determines its nature as a possible military objective;<sup>20</sup> and secondly the waiver may only be granted “when and for as long as no choice is possible between such use of the cultural property and another feasible method for obtaining a similar

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<sup>16</sup> ICRC, *Rule 38: Attacks Against Cultural Property*, “Customary IHL Database”, <https://ihl-databases.icrc.org/en/customary-ihl/v1/rule38> [accessed: 29.06.2024].

<sup>17</sup> Y. Dinstein, *Military Necessity*, in: *Max Planck Encyclopedia of Public International Law*, 2015. Note, however, that Protocol I, Art. 52(2), which defines “military objective”, indicates that “attacks shall be limited strictly to military objectives. In so far as objects are concerned, military objectives are limited to those objects which by their nature, location, purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage”. Accordingly, *future use* (i.e. “purpose”) could potentially make a site a military objective.

<sup>18</sup> B. Drazewska, *Military Necessity in International Cultural Heritage Law*, Brill Nijhoff, Leiden–Boston 2022.

<sup>19</sup> Article 6(b) of the Second Protocol to the Hague Convention of 1954 for the Protection of Cultural Property in the Event of Armed Conflict, 26 March 1999, 2253 UNTS 172. See also E. Varner, *Non-Party Obligations for Cultural Property in Armed Conflict under the 1954 Hague Convention, Protocol II*, in: C. Finkelstein, D. Gillman, F. Rosén (eds.), *The Preservation of Art and Culture in Times of War*, Oxford University Press, Oxford 2022.

<sup>20</sup> An example cited at the Diplomatic Conference was that of a historic bridge, which could confer a military advantage on the enemy. The question was whether it would be permissible, as a pre-emptive move, to destroy the bridge and thus deprive the enemy of the possibility of using the bridge to its military advantage. To sum up the findings, under the old regime of the 1954 Hague Convention it could be argued that in some circumstances this was a case of “imperative military necessity”, whereas under the Second Protocol such action must be ruled out, since it is really the use of a site that turns it into a military objective. J. Henckaerts, *New Rules for the Protection of Cultural Property in Armed Conflict: The Significance of the Second Protocol to the 1954 Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict*, in: N. van Woudenberg, L. Lijnzaad (eds.), *Protecting Cultural Property in Armed Conflict: An Insight into the 1999 Second Protocol to the Hague Convention of 1954 for the Protection of Cultural Property in the Event of Armed Conflict*, Brill Nijhoff, Leiden–Boston 2010.

military advantage”.<sup>21</sup> Moreover, this assessment should be carried out by a force commander;<sup>22</sup> a requirement which, other than demanding an appropriate level of command to proceed with such an attack, also imposes a virtually impossible dilemma on a single individual, who might not be capable of striking the right balance between the interests at stake.<sup>23</sup> To sum up, the new system put in place through the Protocols – while providing new solutions for the effective protection of cultural heritage in armed conflict – still retains some limits,<sup>24</sup> which become rather apparent when confronted with the case of the Kharkiv Art Museum.

As a matter of fact, only a limited number of states have become Parties to the Second Protocol,<sup>25</sup> which does not reflect international customary law and therefore cannot legally bind members of the international community on its own.<sup>26</sup> The continuous and devastating military attacks carried out by the Russian state (which *nota bene* has not ratified the above-mentioned Protocol) in the Kharkiv region testify – together with the serious damage inflicted to buildings of cultural significance, including the Kharkiv Art Museum – to the fragility of the Hague regime.<sup>27</sup>

This brings us back to the subject at hand, which is to say the rather creative solution devised by the aforementioned museum and whether the NFTs generated could, in the event of the destruction of their originals, be deemed worthy of receiving protection under the 1954 Hague Convention.

Having the above in mind, the Convention’s definition will serve as the foundation for our discussion. According to Article 1, the term “cultural property” includes “movable or immovable property of great importance to the cultural heritage of

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<sup>21</sup> Article 6(b) of the Second Protocol.

<sup>22</sup> Article 6(c) of the Second Protocol.

<sup>23</sup> As further explained in Y. Dinstein, *op. cit.*, “The balance between military necessity and humanitarian consideration in the *lex lata* is based on a realistic evaluation of wartime constraints, and concessions to military necessity are routinely made. The treatment of the issue of destruction of enemy property is the best indication of the triumph of pragmatism over idealism. Genuine military necessity can warrant the destruction of enemy property in attack, in defence, and even when armed forces are stationary. Fortifications may be built, razing pre-existing construction; lines of fire may be cleared; crops may be crushed by moving tanks, artillery and heavy equipment; trees may be cut; and so forth”.

<sup>24</sup> K. Chamberlain, *Military Necessity under the 1999 Second Protocol*, in: N. van Woudenberg, L. Lijnzaad (eds.), *Protecting Cultural Property in Armed Conflict: An Insight into the 1999 Second Protocol to the Hague Convention of 1954 for the Protection of Cultural Property in the Event of Armed Conflict*, Brill Nijhoff, Leiden–Boston 2010, pp. 45-49.

<sup>25</sup> List of Parties to the Protocol can be viewed at <https://www.unesco.org/en/legal-affairs/second-protocol-hague-convention-1954-protection-cultural-property-event-armed-conflict> [accessed: 29.06.2024].

<sup>26</sup> J. Dingwall McCafferty, *UNESCO, Cultural Heritage and Conflict in Yemen, Syria and Iraq*, Springer, Copenhagen 2023.

<sup>27</sup> A comprehensive research on the damages caused by the Russian attacks on the Ukrainian territory has been carried out by the NGO Human Rights Watch, see B. Docherty, *Destroying Cultural Heritage: Explosive Weapons’ Effects in Armed Conflict and Measures to Strengthen Protection*, 18 April 2024, <https://www.hrw.org/report/2024/04/18/destroying-cultural-heritage/explosive-weapons-effects-armed-conflict-and> [accessed: 29.06.2024].

every people [...] as well as scientific collections and important collections of books or archives or of reproductions of the property defined above". Although it does not make a direct reference to digital works – which would have been impossible, given the technology existing at that time – this provision constitutes a starting point for assessing cultural property more broadly in armed conflict. In this regard it is noteworthy that another source, the Tallinn Manual 2.0, actually mentions digital works as culturally significant, requiring Parties participating in hostilities to respect cultural property, which encompasses digital cultural property.<sup>28</sup> In so doing, despite the praiseworthy flexibility of the non-exhaustive list of Article 1,<sup>29</sup> the Tallinn Manual's provision better embraces a modern understanding of cultural heritage, while also steering away from the Convention's problematic conception of culture as property.<sup>30</sup>

Once we have established that in the context of armed conflict digital artworks can also be safeguarded, a further distinction must be made in order to differentiate these into two different categories, namely born-digital material and digital copies of physical works. According to the commentary of Rule 142 of the Tallinn Manual 2.0, protection only applies to digital versions when the original is "either inaccessible or has been destroyed, and where the number of digital copies that can be made is limited".<sup>31</sup> The concept of "aura" illustrated in the introductory section of this article would be diminished by mere reproductions, which do not possess the element of authenticity of the originals and are, therefore, worthy of protection only under specific circumstances – circumstances which, however, are not neatly defined.<sup>32</sup>

Despite the lack of clarity, in terms of legal interpretation Rule 142 undeniably acknowledges the cultural relevance of digital copies once the information they

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<sup>28</sup> M.N. Schmitt (ed.), *Tallinn Manual 2.0 on the International Law Applicable to Cyber Operations*, Cambridge University Press, Cambridge 2017, Rule 142.

<sup>29</sup> Article 1 of the Convention states: "For the purposes of the present Convention, the term 'cultural property' shall cover, irrespective of origin or ownership:

- (a) movable or immovable property of great importance to the cultural heritage of every people, such as monuments of architecture, art or history, whether religious or secular; archaeological sites; groups of buildings which, as a whole, are of historical or artistic interest; works of art; manuscripts, books and other objects of artistic, historical or archaeological interest; as well as scientific collections and important collections of books or archives or of reproductions of the property defined above;
- (b) buildings whose main and effective purpose is to preserve or exhibit the movable cultural property defined in sub-paragraph (a) such as museums, large libraries and depositories of archives, and refuges intended to shelter, in the event of armed conflict, the movable cultural property defined in sub-paragraph (a);
- (c) centers containing a large amount of cultural property as defined in sub-paragraphs (a) and (b), to be known as 'centers containing monuments'".

<sup>30</sup> C. Johannot-Gradis, *Protecting the Past for the Future: How Does Law Protect Tangible and Intangible Cultural Heritage in Armed Conflict?* "International Review of the Red Cross" 2015, Vol. 97(900), pp. 1253-1275.

<sup>31</sup> M.N. Schmitt (ed.), *op. cit.*, p. 535.

<sup>32</sup> R. Alcalá, *Cultural Evolution: Protecting "Digital Cultural Property" in Armed Conflict*, "International Review of the Red Cross" 2022, Vol. 104(919), pp. 1083-1119.

carry becomes otherwise unavailable – in other words, once the original is lost or destroyed – and therefore gives an affirmative answer to our previous question regarding the admissibility of the protection of digital works replicating destroyed works under cultural heritage instruments. Nevertheless, it is still debatable whether NFTs *per se* shall be preserved as well – which is the subject of the next section.

## Non-Fungible Tokens as a Way Out

In order to properly frame the meaning behind the expression “non-fungible token”, our study first focuses on its definition: a “tool that uses a blockchain to create a unique, non-fungible digital asset which can be owned and traded”.<sup>33</sup> Based on this description it becomes rather apparent that the goods in question are two-fold: one being the token itself; and the other being the underlying digital object.<sup>34</sup> The non-fungible token is thus an algorithm that contains a set of data as well as a link to a specific digital object.<sup>35</sup> It is subsequently saved to the blockchain, a digital repository protected by a cryptographic mechanism.<sup>36</sup> Other than being two separate entities, the rights over them also differ: the right to enjoy the digital work is what the non-fungible token entails, whereas the right to prevent third parties from reproducing the digital object is connected to the copyright;<sup>37</sup> hence the distinction between two legal goods. The owner of the copyright of the underlying digital asset is thus authorized to generate, or “mint”, the non-fungible token.<sup>38</sup>

In light of the above, it becomes clear that the virtual replica of the physical work, in contrast to the work itself, gives the respective users different utilities. Notably, to quote Benjamin’s theory once again, the virtual replica provides share-

<sup>33</sup> K. Garbers-von Boehm, H. Haag, K. Gruber, op. cit., p. 13.

<sup>34</sup> A. Bigda-Wójcik, *Unlocking the Digital Realm: Exploring NFTs as Catalysts for Digital Copyright Exhaustion*, “Journal of Intellectual Property Law and Practice” 2023, Vol. 18(11).

<sup>35</sup> A. von Appen, *NFTs: Paving the Way to the Digital Future?* “Osservatorio del diritto civile e commerciale” 2021, Vol. 2.

<sup>36</sup> B. Sirgiovanni, *Il non fungible token nella cripto-arte: la ‘recinzione’ dell’oggetto digitale*, in: F. Borgia, B. Sirgiovanni (eds.), *Intelligenza artificiale e diritto: la cripto-arte e la sua circolazione, un dialogo interdisciplinare*, Caucchi Editore, Bari 2024.

<sup>37</sup> For further reading on this subject, please refer to G.M. Ruotolo, *Non fungible tokens e diritto internazionale*, “Rivista di diritto internazionale” 2024, Vol. 2, pp. 393-425; F. Marquette de Sousa, *Token-Art System and the New International Art Market: The Impacts of NFT Technology and the Legal Aspects Involved*, “Journal of Law, Market and Innovation” 2022, Vol. 1, pp. 104-124; F. Borgia, *Intelligenza artificiale, arte digitale e diritto d’autore*, “La Comunità Internazionale” 2024, Vol. 1, pp. 25-46.

<sup>38</sup> For our argument’s sake, we will not elaborate further on the technicalities of NFTs. To read more on this topic, please refer to the following papers: E. Bufano, *Blockchain e mercato delle opere di interesse artistico: piattaforme, nuovi beni e vecchie regole*, “Aedon” 2021, Vol. 2; H. Stublić, M. Bilogrivić, G. Zlodi, *Blockchain and NFTs in the Cultural Heritage Domain: A Review of Current Research Topics*, “Heritage” 2023, Vol. 6(4); O.S. Kulakova, *Digital Art in the Light of NFT: Market Role and Legal Uncertainty*, “Digital Law Journal” 2022, Vol. 3(2); V.D. Burdova, *Legal Nature of Reproducing Museum Objects in the Digital Form of NFT*, “Journal of Digital Technologies and Law” 2023, Vol. 1(1), pp. 152-174.



ability, while only the work itself is capable of delivering its intensity, i.e. the so-called “aura”, which Benjamin calls “the here and now”.<sup>39</sup> Yet comparing the ownership of NFTs to the possession of original physical works is imprecise and obscures key problems associated with the nature of digital works and their protection in the case of armed conflict.<sup>40</sup>

Although the ability to authenticate and record the provenance of digital works may have addressed a long-standing concern in the art community, the relevance of NFT technology does not lie in its availability. As previously mentioned, instead it may serve as evidence that a work is considered valuable and, while possibly not irreplaceable, that it should be treated as cultural property.<sup>41</sup>

The above-mentioned functions recall the norm enshrined in Article 1 of the 1954 Hague Convention and could easily fall under the protection of culturally significant archives and records, as they perfectly describe the act of storing digital information, typically on a device’s local hard drive or a server. Similarly, archived digital cultural property should be safeguarded as “moveable or immovable property of great importance to the cultural heritage of every people”.<sup>42</sup> The very existence of digital cultural property is entwined with the preservation of cultural heritage and its accessibility to societal memory, offering all the more reasons to ensure its conservation. In conclusion, much like regular galleries, libraries, archives, and museums<sup>43</sup> (also referred to as GLAMs, or Cultural Heritage Institutions) are irreplaceable centers of cultural heritage and meaning, NFTs could also be regarded as a precious tool upholding an essential part of our collective heritage.<sup>44</sup>

## Some Final Critical Remarks

Although the findings of our research gave a positive answer to the question posed at the beginning of this article, it must be stressed that there are important critical issues underlying the use of blockchain technology that would prevent this solution from being extended to the generality of cultural institutions (museums, archives, libraries, etc.).

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<sup>39</sup> B. Sirgiovanni, *op. cit.*

<sup>40</sup> G. Contaldi, *I non fungible token nel mercato unico digitale*, in: F. Borgia, B. Sirgiovanni (eds.), *Intelligenza artificiale e diritto: la crypto-arte e la sua circolazione, un dialogo interdisciplinare*, Cacucci Editore, Bari 2024.

<sup>41</sup> C. Granadeiro, *Decoding the Future of Artistic Creations: The Legal Challenges and Possible Solutions for the Regulation of Non-Fungible Tokens (NFTs)*, “Business Law Review” 2023, Vol. 44(6), pp. 192-203.

<sup>42</sup> Article 1 of the 1954 Hague Convention.

<sup>43</sup> To learn more about the various bodies which make up the cultural network worldwide, see ICOM International Committee for Museology, *Key Concepts of Museology*, <https://icofom.mini.icom.museum/publications/key-concepts-of-museology/> [accessed: 29.06.2024].

<sup>44</sup> R. Ong, *Hard Drive Heritage: Digital Cultural Property in the Law of Armed Conflict*, “Columbia Human Rights Law Review” 2022, Vol. 53(1), pp. 249-294.

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As previously stated, NFTs laudably allow for innovative fundraising and perhaps even educational methods that would benefit not only parties interested in buying them, but also potential audiences, fostering a sense of community between participants and the museum.<sup>45</sup> However, serious disadvantages might include the novel nature of the technology itself and environmental unsustainability.<sup>46</sup>

Contrary to common belief, NFTs do not retain artworks forever. While NFTs suggest permanence due to their immutability, their long-term viability is dependent on the ongoing maintenance of the blockchains themselves. Moreover, their function is only guaranteed as long as the link remains intact: as a result compressed formats should be avoided in order to prevent early bit degradation, which can jeopardize long-term access. Migration techniques should also be considered in order to keep digital formats readable. Whenever possible, digital artwork should be kept on external hard drives scattered across multiple geographic locations in order to avoid loss.<sup>47</sup>

Open-source blockchain-related systems should be prioritized for long-term preservation, since if the platform becomes corrupted the underlying code is open and freely available, allowing anybody to retrieve information. In terms of preservation discussion is still ongoing, which is especially important given the potential for ethical problems surrounding NFTs. The biggest ethical issue for heritage experts dealing with NFTs is how they stimulate the ongoing maintenance of the blockchain sector, which leads to the destruction of other cultural assets due to blockchains' massive carbon footprint. This approach is thus contentious, since one must pick what to retain, as it is impossible to preserve market-traded NFTs without endangering other cultural and ecological sites – a rather paradoxical outcome given the ultimate aim of its employment.<sup>48</sup>

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<sup>45</sup> Y. Jung, *Current Use Cases, Benefits and Challenges of NFTs in the Museum Sector: Toward a Common Pool Model of NFT Sharing for Educational Purposes*, "Museum Management and Curatorship" 2023, Vol. 38(4).

<sup>46</sup> P. Calvo, *Cryptoart: Ethical Challenges of the NFT Revolution*, "Humanities and Social Sciences Communications" 2024, Vol. 11.

<sup>47</sup> A. Nogueira et al., *NFTs and the Danger of Loss*, "Heritage" 2023, Vol. 6(7).

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