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ARTICLE



## Art, antiquities, and blockchain: new approaches to the restitution of cultural heritage

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### ABSTRACT

Objects of cultural heritage present a unique and important opportunity for the use of blockchain technology. Specifically, blockchain, a distributed ledger technology, can be used to disincentivize the sale of looted objects and to manage shared stewardship, ownership, and exhibition of these contested artifacts taken through war or colonialism. We offer background on repatriation of antiquities using the Byzantine Fresco Foundation as a core case study; introduce a working model of stakeholders in antiquities markets in both contemporary and historical context; and propose a blockchain solution using four different cases. The paper draws on newly sourced archival documents, game-theory interpretations of stakeholder behavior and application of this new technology in regulatory context. These blockchain applications are especially timely with the publication of the Sarr Savoy Report and the Arts Council England's rewriting of its restitution guidelines for museums and galleries.

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cultural diplomacy;  
intellectual property;  
restitution; stolen artifacts

The relation to others is often mediated by history (the past). The condition for freedom is not to be governed by the past, but to re-write it in the present (time).

– Felwine Sarr and Bénédicte Savoy, *The Restitution of African Cultural Heritage*<sup>1</sup>

Blockchain, the distributed ledger technology, offers novel approaches for problems in antiquities and objects of cultural heritage more broadly. Specifically, the structural properties of blockchain make it easier to design registries of provenance and to build flexible shared ownership structures. Blockchain allows the separation of many different types of rights: ownership rights, exhibition rights, different forms of revenue or cash flow shares, and dividends from investment structures.<sup>2</sup> This flexible range of tools offers new avenues for cultural diplomacy and negotiation. In many cases, these solutions could leave all parties better situated.

By way of background, and as defined at greater length later in the paper, a blockchain is a digital ledger of time-stamped and immutable records. The ledger is distributed, meaning kept in multiple interconnected copies across a network of computers. The data on the blockchain is referred to as blocks, and the blocks are bound to each other in a 'chain' with multiple layers of cryptography. Blockchain's key significance is that it allows someone to trust the information contained on the blockchain without trusting a central authority.

While blockchain is commonly associated with crypto-currencies such as Bitcoin, it has applications beyond these alternative currencies. The underlying technology can allow objects to be tokenized, *i.e.*, to allow the recording of fractional ownership with specific rights allocated to separate parties. One can think of 'tokenization' as assigning an object a digital identity. For example,

a French museum could hypothetically continue to have the right to display an object but return ownership rights and payment rights to the source country. The owner of each specific right would be recorded immutably in the 'blocks' on the 'chain' and could be checked against the ledger by relevant parties. On a prospective basis, blockchain can also be used to register objects at the point of discovery on archeological digs, leading to much greater clarity of ownership and provenance in the future. These blockchain-enabled approaches can be respectful toward questions of identity, heritage, authorship and cross-cultural definitions of property.

The potential application of the blockchain to the world of antiques requires a cross-disciplinary analysis across fields including law, technology, arts administration, anthropology, and cultural patrimony. This article examines this web of considerations by using the case study of the Byzantine Fresco Foundation to identify the prototypical stakeholders. It then examines the legal and technological context of the application of the blockchain to antiquities, followed by four conceptual models.

## I. The case of the Byzantine Frescoes

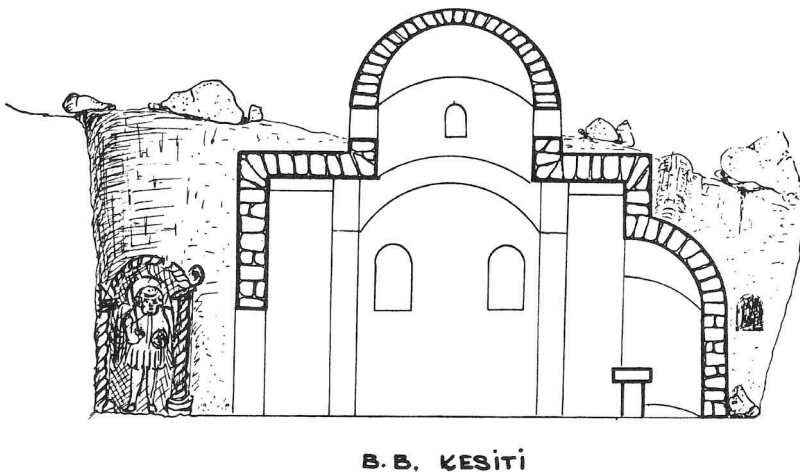
In 1983, two black-and-white photographs of frescoes (see [Figure 1](#)) surfaced and were shown to Bertrand Davezac, the curator of antiquities at the Menil Collection in Houston, Texas (Davezac 1991). Days later, he, Dominique de Menil, the co-founder of the Menil Collection, and some of their colleagues met with dealers in a Munich, Germany, apartment – by candlelight because there was no electricity – where they were shown the frescoes.<sup>3</sup> Mrs. de Menil had seen many works over the course of her career. She instantly thought the frescoes were 'living icons' and was worried for their safety. One of the men with whom they were meeting, Aydin Dikmen, would later be identified as a known and prosecuted looter of cultural antiquities (Davezac 1991). The frescoes' sellers had gone



**Figure 1.** Black-and-white reference photograph of the dome fresco Christ Pantokrator. Courtesy: The Menil Collection.

through a lot of trouble to present the works as legitimate. They had even commissioned drawings of a fictional chapel (see Figure 2) (Davezac 1991, 9–11).

In order to buy time to perform required due diligence, de Menil advised the sellers she was interested in purchasing the frescoes and then immediately hired the former U.S. Attorney General Herbert Brownell to identify the rightful owners. A letter was sent to thirteen countries. While three claimed ownership, one had pictures. These frescoes had come from a small church in Cyprus, the church of St. Thermanianos which is often referred to as Lysi after its location (see Figure 3).<sup>4</sup> The church at Lysi is part of the Autocephalous Greek Orthodox Church of Cyprus. This church was catalogued in 1936 by the historian Rupert Gunnis and in the 1970s by the Government of Cyprus, but is in an area under Turkish military occupation.<sup>5</sup> The frescoes on offer had been stolen sometime during or after the Turkish Occupation of Northern Cyprus in 1974, and cut out of the dome in large sections.



**Figure 2.** Fictional drawing of the Frescoes Chapel. Courtesy: The Menil Collection.



**Figure 3.** Chapel at Lysi. Courtesy: Laurence Morrocco.

After this discovery, de Menil made a decision to start a separate organization called the Byzantine Fresco Foundation, an independent entity working in collaboration with the Menil Foundation which already operated the Menil Collection in Houston, Texas. The Byzantine Fresco Foundation and the Church of Cyprus, entered into an agreement by which the Menil Collection and the Byzantine Fresco Foundation together would conserve the frescoes and maintain the rights to exhibit them for fifteen years in a standalone consecrated Greek Orthodox chapel. At the end of the contracted time, the two parties would review the agreement and if the Church of Cyprus wanted the frescoes back, then they would be returned.<sup>6</sup>

Once the Church of Cyprus and the Byzantine Fresco Foundation had established a clear understanding of ownership and exhibition rights, they had the freedom to renegotiate the terms; parties that might otherwise have been antagonistic were able to work together because legal ownership of the stolen works was no longer in question. For instance, the agreement was later renegotiated so that the fifteen-year term would commence at the completion of a highly involved multi-year conservation process.<sup>7</sup>

All told, the Byzantine Fresco Foundation paid an estimated 520,000 USD to acquire the frescoes on behalf of the Church of Cyprus and an additional 530,000 USD on the conservation process (Povoledo 2011). The architecture firm FdM:Arch was commissioned to create the Byzantine Fresco Chapel Museum, a purpose-built consecrated chapel for the works, located within the Menil Collection campus (see Figure 4). There the works remained on view to the public from 1997 until 2012 when they were returned to Cyprus.

The frescoes were not ultimately returned to the church at Lysi. Having been painted in situ, the frescoes would have been impossible to restore without being encased in such a way that they would no longer fit through the chapel door. Instead, and in consideration of the continued occupation as well, the frescoes went to the Byzantine Art Museum of the Archbishop Makarios III Cultural Foundation in Nicosia, Cyprus, where they were displayed alongside other looted but returned artifacts (Povoledo 2011).

In the universe of cases concerning illegally sourced cultural materials, it is rare to encounter one similar to the Lysi frescoes. An interested but wary collector activated a global provenance search that resulted in multi-institutional cooperation and a unique public display agreement. The combination of private philanthropy and institutional collaboration made this outcome possible. Yet the larger significance is also in the chain of ownership transactions established through the cooperative agreement. Why is it not just another provenance case? The story of the Byzantine frescoes illustrates the adjacency between legality and illegality in complex gray markets for antiquities. Although the capacity of the Foundation to finance the operation may not be directly replicable by other organizations, the larger story functions as a case study of the potential stakeholders from which we develop proposals for settling theft and restitution claims. Specifically, it illustrates the different parties that may have an interest in various rights including underlying ownership, exhibition, revenue sharing and registration. Blockchain promises to lead us out of the cul-de-sac of zero-sum ownership disputes, as exemplified by the Elgin Marbles case, and toward more multi-party, shared-custody agreements.

As discussed more fully below, blockchain provides a vehicle by which this type of consensual allocation of rights can be more efficiently achieved. However, before that discussion can begin, an overview of the legal context and the blockchain technology itself is required.

## II. Legal and jurisdictional context

Because blockchain allows the management of fractional ownership and royalty structures, it may be possible to design broad cultural ownership into contractual arrangements for repatriation or compensation.<sup>8</sup> These arrangements exist in complex legal, jurisdictional and financial contexts. Various international and bilateral treaties cover the removal of objects of cultural heritage during





**Figure 4.** Byzantine Fresco Chapel and museum. Courtesy: The Menil Collection, © Paul Warchol.

wartime (Hague Convention) and peacetime (UNESCO) and the return of objects once they have been taken (UNIDROIT).

The 1954 *Hague Convention for the Protection of Cultural Property in the Event of Armed Conflict* (the 'Hague Convention') laid the foundation for international protection of cultural property (HCCH 2007; ICRC n.d.; UNESCO n.d.). The Hague Convention was, in part, a response to the massive damage to and looting of cultural property by the Nazi regime during World War II (Wegener 2010). It was not until 1970 – when UNESCO passed a resolution on trafficking of antiquities – that there was a global effort to focus the protection of cultural property outside of a war context. Under the UNESCO Convention, member nations are required to take measures to prevent trafficking, to make reasonable attempts to recover and return stolen property and to cooperate internationally to prevent trafficking (UNESCO n.d.b, n.d.c).<sup>9</sup>

The 1970 *UNESCO Convention on the Means of Prohibiting the Illicit Import, Export and Transfer of Ownership and Cultural Property* (the 'UNESCO Convention') extended the Hague Convention's focus on wartime by establishing a framework for preventing illicit trafficking of cultural property during peacetime. Member states agree to try to prevent the acquisition or import of illegally removed

cultural property and also to impose penalties or administrative sanctions where illicit import or export has occurred. The UNESCO Convention, like the Hague Convention, is not self-executing. There are 140 Member States to the UNESCO Convention, including the European Union and the United States (UNESCO [n.d.c](#)).

The United States implemented UNESCO in 1983 when it passed the Cultural Property Implementation Act. In implementing the UNESCO Convention, the United States only adopted two Articles (Article 7(b)(i) and 9<sup>10</sup>), crucially omitting Article 3, which provide that the 'import, export or transfer of ownership of cultural property effected contrary to the provisions adopted under this Convention by the States Parties thereto, shall be illicit.'<sup>11</sup> Further, the United States' interpretation of Article 9 requires it to have a bilateral agreement with other countries in order to make it enforceable. The United States currently has agreements with nineteen countries (BECA [n.d.](#)).<sup>12</sup>

Whereas the framework of the UNESCO Convention focuses on preventing export of cultural property, the 1995 *Convention on Stolen or Illegally Exported Cultural Objects* (the 'UNIDROIT Convention')<sup>13</sup> focuses on the restitution of cultural property. The UNIDROIT Convention focuses on the culpability of, and the recovery of, stolen property from the possessor of the cultural property, not the State (UNIDROIT [1995](#)). Unlike the Hague and UNESCO Conventions, the UNIDROIT Convention is self-executing. There are 63 Member States; the United States is not one (UNIDROIT [2019](#)).

In addition to the multilateral treaties, there are a number of bilateral treaties or memoranda of understanding (MOU) between countries. These agreements are of particular significance for the United States in their power to affect the application of the UNESCO Convention. These bilateral agreements contain more detailed information about how to address cultural property between the two signatory states. It is generally difficult for a country without a bilateral agreement or memorandum of understanding ('MOU') to pursue a restitution claim against the United States (Kuzma [2019](#)).

When a state claiming ownership of cultural property has filed a lawsuit for the return of cultural property exported from its territory, the court must choose which substantive law governs. The choice of jurisdiction may be especially determinative given that most cultural property cases will involve a good-faith purchaser, and jurisdictions often treat good-faith purchasers very differently (Fincham [2008](#)). Usually, courts will apply the substantive law of the country where the cultural property is situated at the time the suit is brought. While this approach offers a level of certainty for good-faith purchasers looking to acquire unproblematic goods, it could also disincentivize 'good-faith' purchasers from thoroughly researching the provenance of ancient goods. Less commonly, courts apply the law of the country where the cultural property originated, necessarily favoring the return of an object to its country of origin (Fincham [2008](#)).<sup>14</sup>

Numerous court cases or controversies, some ongoing, have highlighted issues of clear theft, ambiguous sale, and problematic possession. Those controversies include long-standing contested items such as the Elgin Marbles which reside in the British Museum rather than the Parthenon (Anderson [2016](#), 156–157; Merryman [2009](#)), as well as many complexities in the donation and registration of privately held collections. Regarding private market transactions, in June 2019, the Egyptian government appealed to Christie's auction house in London to stop the sale of a sculpture of King Tutankhamun dating from 1,000 BCE. The sculpture had changed hands in 1985 (via dealer Heinz Herzer in Munich) and in 2016 (via Christie's). The Egyptian embassy in London asked the auction house and the British foreign affairs ministry to stop the estimated 5 million USD sale. Despite these requests, Christie's went forward with the sale (Moss [2019](#)).<sup>15</sup>

Some actors have started to raise awareness and take responsibility for the potential return of works. Following from a recent report commissioned by the French President Emmanuel Macron, it is possible that the French government will return or loan numerous artifacts that currently reside in French museums back to the African source countries. It is estimated that 95% of African cultural artifacts are held outside the continent, with 90,000 significant objects from sub-Saharan Africa held

in French museums (Sarr and Savoy 2018). In other regions of the world, the ongoing looting of artifacts has been studied by various scholars (Moskowitz 2019; Fincham 2008; Greenland 2016) as an important funding source for ISIS.

### III. Blockchain primer

Blockchain is a distributed ledger technology that has wide applications for registering property, provenance, and authenticity. A blockchain ledger permanently records, in 'blocks,' the history of records. All the completed and authenticated transaction blocks are connected and 'chained' from the beginning of the chain to the most current block – hence, the name 'blockchain.' The technology was first developed by Haber and Stornetta (1991) and popularized following Satoshi Nakamoto's Bitcoin white paper and related launch of the Bitcoin cryptocurrency (Nakamoto 2009; Brekke 2019). The origins of blockchain were registrarial, that is, aligned with more art historical concerns of provenance.

On a blockchain, any piece of information can be registered. The first piece of information in any blockchain is the 'genesis node'. All subsequent additions of records are encrypted through a mathematical one-way hash function and then chained together with each transaction before and after. Each entry has a digital signature, signed with a private key that is cryptographically secure. These chains are culled into blocks that are completed when a peer-to-peer (P2P) network of computers known as nodes compete with each other to verify each block. The computers solve brute-force computing puzzles – finding what is called the 'nonce' and winning cryptocurrency as a reward. Although blockchain is strongly associated with these digital currencies such as Bitcoin, the currencies arose in order to support the underlying record-keeping (Whitaker 2019a; Schneider 2018; Fincham 2019).

In the case of a 'public' blockchain, like the Bitcoin blockchain, the network is completely open and anyone can join and participate in the network (and add transactions or information, e.g. blocks). By contrast, in a private blockchain network, participants require an invitation to join and participate in the network (Narayanan et al. 2016). Businesses that establish a private blockchain will generally set up a permissioned network. Private blockchains are often used in industries to allow organizations to choose to share some but not all information, in order to maintain a degree of privacy. As such, private blockchain networks could be set up so that museums, countries, or other relevant parties in the antiquities world could keep some records confidential while also sharing the registry. Further, an institution or a country's records could be connected across a network of permissioned and public information. Blockchain has an unusually low risk of fraud because tampering with the ledger entries would have to occur in all of the many ledgers in the system at the same time.

These technologies have been applied to the fine arts for purposes ranging from provenance (Bailey 2018; Wierbicki and Rottermund 2019) to fractional equity (Whitaker 2018; Whitaker and Kräussl 2020) to art projects (Catlow et al. 2017). Blockchain also has applications to copyright of objects (Evans 2019), a field already in flux (Towse 2010). The following stakeholder analysis explores how these forms of value might conceivably be arranged; with a focus on structures that recognize shared cultural as well as financial ownership, and structures in which all actors may benefit relative to their current position.

### IV. Stakeholders of scenarios

The various stakeholders from the Lysi frescoes still exist today. These stakeholders include: the source country (Cyprus), the organization (the Church of Cyprus), the community who claim cultural ownership, which is not easily defined, and the displaying institution (the Menil Collection). These stakeholders are negotiating multiple sets of rights that include: ownership, exhibition, reproduction, moral rights, and adaptation. Ownership not only covers the physical care of the object but fair title to sell it or rights to borrow money against it, to fractionalize it, or to otherwise securitize it.



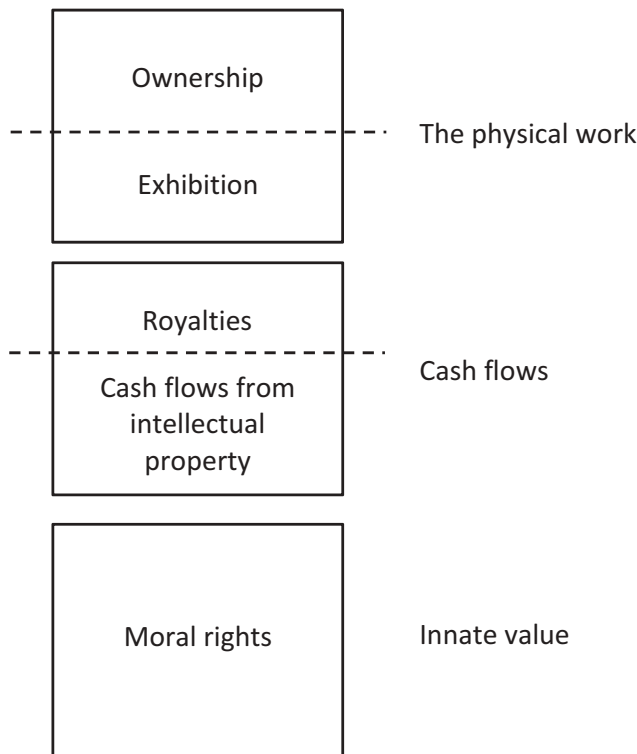
Blockchain can allow all of these rights to be negotiated in creative and useful ways that were previously not easily actionable.

**Case 1: splitting ownership and exhibition rights**

The Lysi Frescoes case successfully splits ownership and exhibition rights by creating a fixed term for exhibition rights (see [Figure 5](#)). In contrast, the Parthenon Marbles dispute between the British Museum and the Greek government shows the difficulty of zero-sum contested ownership (Greenfield 2013).<sup>16</sup> The British Museum argues that the marbles were taken lawfully with permission of the Ottoman Empire, then governing Greece. The British Museum also makes a public benefit claim that visitors can access them. They argue that the marbles ‘are a part of the world’s shared heritage and transcend political boundaries.’ They will not loan the works to Greece without legal recognition of their ownership, and they reject offers by Greece of mediated conversation (British Museum [n.d.](#)). Although a powerful tool, blockchain cannot resolve a zero-sum conflict. This case illustrates the underlying fact that ownership would need to be agreed before other rights could be explored and recorded through the use of blockchain.

**Case 2: returning of a portion of a group of artifacts**

The restitution of African artifacts from French museums offers a more fruitful area of exploration for the kinds of shared value structures that could be possible if the institutions are not at an impasse. As noted in the Sarr and Savoy report commissioned by French President Emmanuel Macron, the sheer number of objects held in overseas museums is remarkable (see [Table 1](#)). The Musée du Quai Branly-Jacques Chirac in Paris alone holds 70,000 objects from sub-Saharan Africa (Sarr and Savoy 2018, 23).



**Figure 5.** Splitting the rights stack (Physical work, cash flows, moral rights).

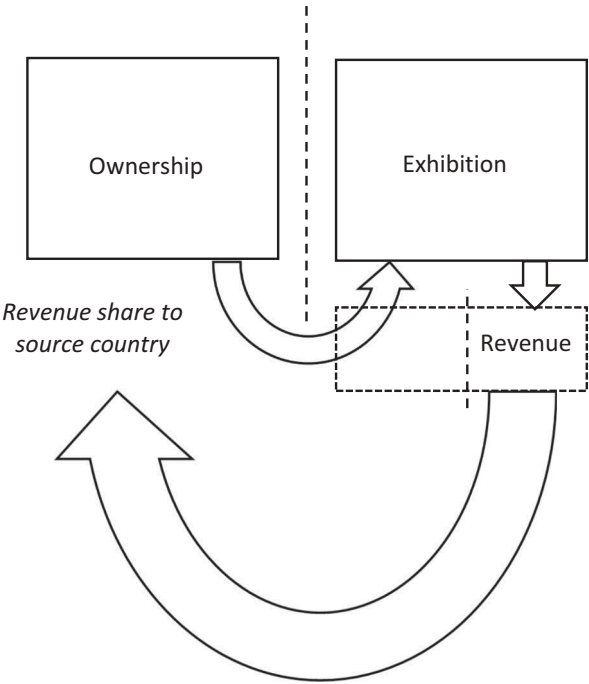
**Table 1.** Estimated Number of Artifacts from Sub-Saharan Africa in Museum Collections.

Museum	Location	Number of Objects
The British Museum	London, United Kingdom	69,000
The Weltmuseum of Vienna	Vienna, Austria	37,000
Musée Royal de l’Afrique Centrale	Tervuren, Belgium	180,000
Musée du quai Branly-Jacques Chirac	Paris, France	70,000

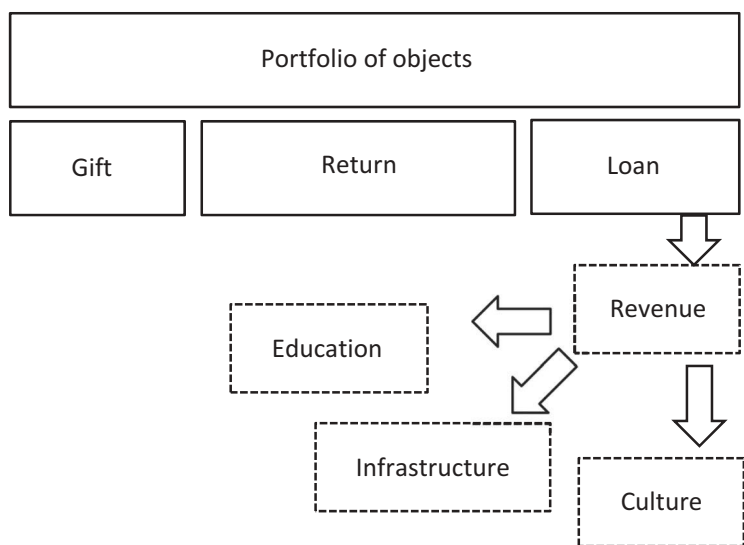
Data source: Sarr and Savoy (2018).

Considering the percentage of a museum collection that is on display – typically less than five to ten percent – it is likely that these museums hold many of these artifacts in storage. With a group of objects instead of a single object – and with many objects that are in storage – it becomes possible to design a portfolio approach (see Figure 6). As one example, a percentage of the 70,000 objects could be returned. The remainder could be recognized simultaneously as owned by, for instance, Burkina Faso, but then gifted to France. Another portion of the objects could be returned to ownership by Burkina Faso but with the French Museum retaining exhibition rights and then sharing revenue back to the source country. The revenue share can be structured as a proportion of ticket sales or as a token (see, for example, Howell, Niessner, and Yermack 2018). In a hypothetical case, a country could grant access to all objects to France in exchange for 50% of the ticket revenues from the museum. These revenues are sent, via smart contract structure (McKinney, Landy, and Wilka 2018), into a fund that supports source nation projects (see Figure 7).

The revenues from the exhibition can be supplemented with token structures that crossover philanthropy and investment support. Tokens can be purchased by individuals who become ‘micro-donor’ members of the global public. While these issues of support for arts and cultural infrastructure are



**Figure 6.** Split of ownership and exhibition rights with cash flows to source country.



**Figure 7.** Portfolio of museum objects (Partial return with cash flows).

complex in both source country and more resourced Britain or France (Bennett 1995), blockchain allows for more flexibility to design shared outcomes. These negotiated hybrid structures of gift, exhibition rights, and revenue streams holds many possibilities for support of financial and cultural capital.<sup>17</sup>

### Case 3: recording of works in active archeological digs

Blockchain can be used at active archeological dig sites in order to register objects and, if appropriate, to assign fractional ownership at that stage. The more these objects are registered, the more, over time, it would become difficult to sell unregistered objects, thus dampening a long history of gray-market transactions. If fractional ownership is registered at that stage, there is the potential for the local community also to benefit from the sale.

Registration of objects would lower the ease of sales to fund terrorist or criminal organizations. As Taylor Moskowitz has written in the *Cardozo Arts & Entertainment Law Journal*, the sale of looted antiquities is a significant source of funding for the Islamic State of Iraq and the Levant (Moskowitz 2019). Sociologist Fiona Rose-Greenland cites a range of estimates for the amount of money raised by ISIS through the sale of stolen antiquities. Based on the work of other scholars and intergovernmental organizations, these estimates range from 4 million USD and 7 billion USD (Greenland 2016).

In a study of ‘Satellite Imagery-Based Analysis of Archeological Looting in Syria,’ Jesse Casana found over 4,500 archeological sites in Syria alone. In imagery-based study of 1,200 of those sites, Casana estimated that 25% of the sites had been affected by looting (Casana 2015).<sup>18</sup> The registration functions as a ‘fair trade’ certification to allow circulation of these objects in markets. The objects may be fractionally owned across local communities, source nations, archeologists, and dealers.<sup>19</sup>

### Case 4: selling or donating privately held works

Finally, blockchain can also offer solutions for privately held works that cannot be comfortably sold or donated. Perhaps a collector owns works that were acquired in 1973, thus after the 1970 UNESCO Convention and prior to the growing awareness of the problems associated with these collecting efforts. Although the 1970 UNESCO Convention did not create universal amnesty, it is that much harder for dealers to become comfortable selling works acquired after that point. If we have ten

works that are worth 100,000 USD each, a collector in the United States might try to donate them to a museum which, if the collector had a 40% tax rate would give them a 400,000 USD tax benefit. They also might try to sell them and net 640,000 USD after an assumed 20% auction commission and 20% in long-term capital gains tax (see [Figure 8](#)).

There are huge risks associated with both of these numbers from a regulatory standpoint, so the question is: What other solutions can be developed here? For example, the collector can negotiate to sell or donate only a portion of the work by giving a fraction of the proceeds of the sale or donating to the source country a fraction of a larger body of works.

Many of these outcomes could leave all of the parties better positioned especially if one accounts for risk and uncertainty: the work is in circulation; each party is paid; the transaction, ownership breakdown, and provenance are cemented on a distributed blockchain; the cultural artifacts are at least partially returned; and negotiators can prioritize higher proportion of return of objects where important to the source country. At a practical level some of that funding may come directly from a U.S. non-profit that manages these transactions, maximizing tax benefit of donation and also generating tax revenue indirectly from the sale of some of the objects. [Figure 9](#) shows an example of one of the many complex structures that can be imagined to create a negotiated benefit for the collector and source country, with reliance on tax incentives where they exist.

V. Policy and advisory implications

While it will be important for nation states and international bodies such as UNESCO to set standards to encourage conversations around restitution, there is a limitation to what centralized bodies can do. Protecting the autonomy of the participants in the conversation requires the lack of a top-down solution. An international non-profit advisory organization could opine and consult both on the technology and on the structure of interaction – that is, the process not the outcome. Other neutral parties could host conversations and propose creative specific solutions. Nation states and UNESCO

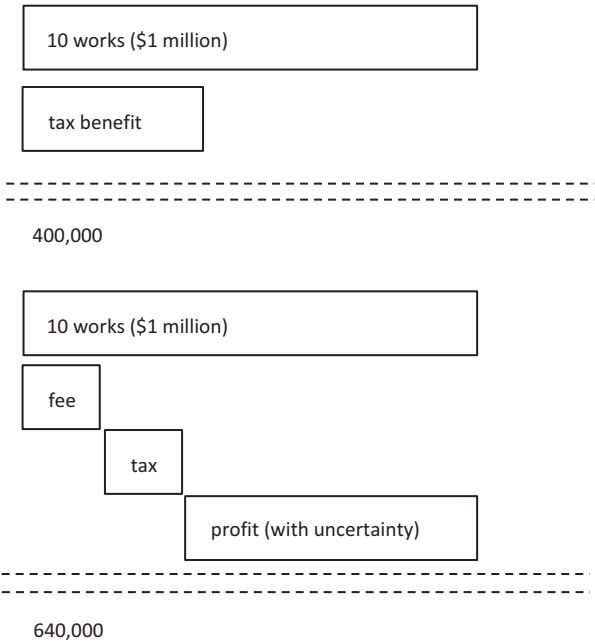
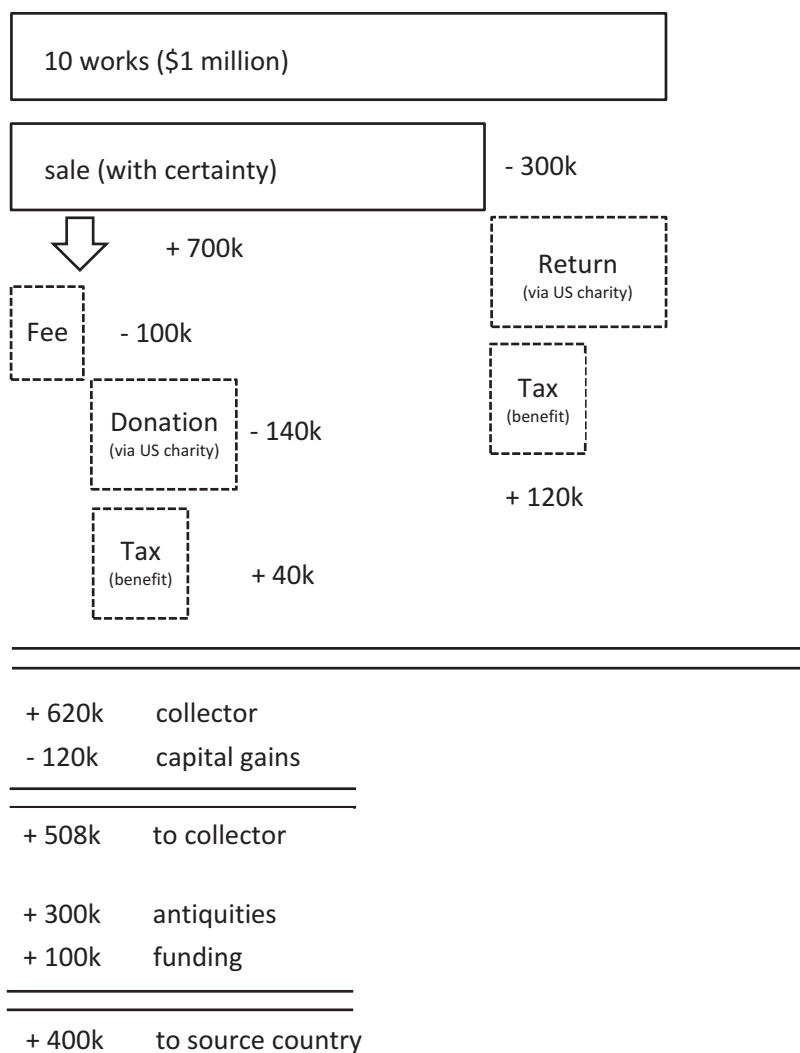


Figure 8. Donation or sale under uncertainty (Hypothetical benchmark).



**Figure 9.** Example of split sale and donation.

could helpfully issue calls for proposals and also encourage research and scholarship on the economics of cultural heritage (Throsby 2010; Throsby 2012; Hutter and Rizzo 1997).

In an unusually large proportion of possible scenarios, it is possible for many of the stakeholders to be in a better situation than they are currently. Following from the principles laid out in this paper, the number of potential negotiated arrangements is near infinite. Because the best outcomes will vary from situation to situation, it will be important to pay nuanced attention to the specifics of each circumstance, to listen to the needs of the stakeholders, and to design the process by which the parties come together. This focus on process is critical because the potential solutions are not merely financial and transactional but cultural and human. Sarr and Savoy provide language for this broader value of cultural objects when they write, 'Can we thus think of restitutions as being something more than a mere strategic maneuver – neither merely an economic or political strategy – but rather something truly cultural in the sense of the Latin verb *colere*, to “inhabit,” “cultivate,” and “honor”?' (Sarr and Savoy 2018, 22).



The focus on dignity and stewardship opens up much broader and even more difficult questions of whether the return of physical objects is the highest answer to questions of cultural heritage. The easily avoided existential question is whether the source country needs a particular mosaic fragment in order to honor its history, whether it needs some but not all of the fragments, or whether it can honor those objects in their exhibition abroad while also funding new regenerative projects at home. In some cases, it may be possible to preserve and honor cultural heritage from the outside, while placing resources back in the hands of the source country as forms of reparation, if not always repatriation of objects.<sup>20</sup> These are questions only the source country, its citizens, and its institutions can answer.

Our goal in this stakeholder analysis is to offer novel, collaborative frameworks for repair, restructuring, and education at a time many people globally feel desperate politically, socially, and economically. We aim to replicate the enabling generosity and purpose exhibited by de Menil but in ways that do not require her *deus-ex-machina* intervention but that instead can create positive economic incentives and healthy governance structures (Yermack 2017) across international partnerships. The key actors and institutions required to develop these solutions are in existence but may not come together on their own.

## VI. Conclusions

Blockchain allows the decoupling of ownership and exhibition rights, and the assignment of shared ownership and shared revenue. In addition, other parties, such as micro-donor members of the public anywhere in the world, could also purchase tokens in the project (and potentially receive tax-deductions or other benefits). These potential applications of blockchain are promising in advancing the causes of preservation of cultural heritage, public access, support of art and culture, and economic development. These conversations build new versions of the collaborative networks intended in the original 1970 UNESCO resolution, while dignifying and respecting the autonomy of the varied source countries. A wide variety of negotiated arrangements can support access, education, pride of ownership, and preservation, as well as cash flows for cultural and general entrepreneurship. These systems can begin to align ‘fair trade’ and social justice for antiquities all over the world.

Further research directions include piloting conversations with museums and source countries and with private collectors who wish to sell or donate objects. Through these pilots, one can decide which blockchain structures – public or permissioned – best serve the countries and organizations. In addition, further research could be undertaken on formal game-theory analysis of the incentives and equilibria of actors in these ‘games.’

The antiquities market, which comprises all stakeholders mentioned herein, is vastly complex and requires an equally complex management structure to ensure its ethical and transparent evolution. Blockchain provides a unique and exciting opportunity to unify cultural heritage, cultural education, safe stewardship, historical preservation, and social impact. We aim to bring to this topic a spirit of repair, of autonomy, and of respect for rightful owners, and an engaged sense of ethics that requires dealing with the world as it is not only as we wish it already were. To use the language of Sarr and Savoy, ‘the condition for freedom’ is to allow the past to be determinative of the present and the future to be designed.

## Notes

1. Sarr and Savoy (2018, 89).
2. For larger legal studies of the nature of rights to property, see, for example, Honoré’s (1987).
3. For more information on the de Menils and the Menil Collection, see Helfenstein, Schipsi, and Booth (2010).
4. Emblematic of the Byzantine style, the frescoes date to the 13th century – though scholars debate the dating (Carr 1991, 36; Carr 2010, 165). The bowl of the dome contains Christ Pantokrator – translated roughly as ‘Almighty’ or ‘ruler of all’ – in which the haloed Christ holds the Gospel in his left hand and raises his right hand in benediction.

5. In his 1936 book *Historic Cyprus*, the historian Rupert Gunnis had described this church, St. Thermonianos (or St. Ephimianos) and commonly referred to as 'Lysi' after the nearby town (Gunnis 1936, Carr 2010, 159). As Gunnis wrote, by 1936, most of the walls of the chapel had been whitewashed, except for the frescoes in the dome and apse, 'both...superbly painted and in a marvelous state of preservation' (Carr 1991, 33). Gunnis dates the church to the 14th Century and calls it by its alternative name, St. Ephimianos (Carr 1991, 37). Gunnis worked as the Inspector of Antiquities for the Cyprus Museum from 1932 to 1935. In 1972, the Department of Antiquities of Cyprus further catalogued the frescoes (Carr 2010, 159). Then, in 1974, Turkey invaded Cyprus, and the area around Lysi became seized land (Carr 1991, 33).
6. The Church of Cyprus and the Byzantine Frescos Foundation negotiated the arrangement from 1983 to 1985 (Carr 1991, 12).
7. The conservation team was headed by Laurence Morocco, who began work when thirty-eight flattened fresco fragments were delivered to a warehouse in London. At that point, no one knew the arrangement of the fragments. They were like puzzle pieces in a box. In addition, no one knew the exact size and shape they would take. The frescoes had been cut out, and so there would be space between them where the cuts had been made. Morocco and his team only had as reference the two grainy photographs (Morocco 1991). Over three years they calculated the circumference of the dome. To figure out the height of the dome, they hung a piece of chain and then a piece of wet chair caning between two points on the circumference. The conservators built a model of the dome but then had to modify the perfect shape, shaving it down to match the irregularities in the original plaster. To work on the dome and be able to sit inside it without sitting on it, they hired the engineering firm Arup – known for skyscrapers and suspension bridges – to build scaffolding that fit inside but did not touch the dome. For the final holding structure of the frescoes, they hired a boatbuilding firm. To conclude this process, they knocked out a wall in the warehouse to be able to remove the two-thousand-pound crate that would be driven to Paris and flown to Houston (Morocco 1991, 125–157). Morocco's personal essay on the conservation process is highly recommendable as reading, whether for the world's most interesting arc- and circumference-math word problem or for Morocco's telling of his experience discovering the church at Lysi for the first time, years into the conservation process, and having a military tank pull up while he was in the midst of photographing the space.
8. In addition to the legal ownership and physical possession of the works, there is also the question of cultural authorship and control of images. The U.S. non-profit Local Contexts, founded by professors Jane Alexander and Kim Christen, has created a 'traditional knowledge' tagging system by which 'local, traditional, and Indigenous' communities can assert their ownership and authorship rights digitally (Anderson and Christen 2013). The U.S. Library of Congress and other systems support the Local Context tagging systems for Native, First Nations, Aboriginal, Inuit, Metis, and other indigenous communities. While an artifact may be contested between a museum abroad and a national government, the object is owned in a longer-standing historical tradition and context that is only represented by the government. While outside the scope of this paper, these tools for relocated authorship support the larger ethos of restitution.
9. The Hague Convention was the first international treaty focusing entirely on the protection of cultural property, specifically during an armed conflict. Each signatory state agrees to prevent the exportation of cultural property from any territory it occupies during an armed conflict; to take into its custody cultural property imported into its territory either directly or indirectly from any occupied territory; and at the end of such occupation to return cultural property. The Hague Convention is not self-executing, so member states need to adopt domestic legislation to implement it. The Hague Convention has been ratified by 133 states, including the European Union which joined in 2007 and United States which ratified it in 2009 (HCC 2007).
10. Article 9 reads: 'Any State Party to this Convention whose cultural patrimony is in jeopardy from pillage of archaeological or ethnological materials may call upon other States Parties who are affected. The States Parties to this Convention undertake, in these circumstances, to participate in a concerted international effort to determine and to carry out the necessary concrete measures, including the control of exports and imports and international commerce in the specific materials concerned. Pending agreement each State concerned shall take provisional measures to the extent feasible to prevent irremediable injury to the cultural heritage of the requesting State.'
11. [http://portal.unesco.org/en/ev.php-URL\\_ID=13039&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/en/ev.php-URL_ID=13039&URL_DO=DO_TOPIC&URL_SECTION=201.html).
12. These countries are: Belize, Bolivia, Bulgaria, Cambodia, China, Colombia, Cyprus, Egypt, El Salvador, Greece, Guatemala, Honduras, Iraq, Italy, Libya, Mali, Nicaragua, Peru, and Syria.
13. <https://www.unidroit.org/instruments/cultural-property/1995-convention>.
14. In July 2018, a New York judge ordered the return of an ancient bas-relief depicting a Persian guard to Iran. This was after the relief was seized by investigators in the Manhattan DA's office from the Park Avenue Armory in 2017. The two alleged good-faith purchaser owners agreed to surrender the item. The sculpture dates to approximately 500 B.C.E. and is worth \$1.2 million (Mashberg 2018). As noted above, the fact of whether or not the individual or institution holding the cultural property was a 'good-faith' purchaser can be dispositive in many instances. In this instance, the good-faith purchaser would not have helped the collectors, who were

defending their rights in New York, where courts have become increasingly inclined to return objects with suspect provenance.

15. In an unusual lawsuit regarding cultural heritage, Sotheby's along with co-plaintiffs the Howard and Saretta Barnett family brought suit against Greece, disputing Greece's claim of ownership of an ancient bronze Greek statue of a horse that was to be auctioned (Barnet et.al. 2018). The family was planning to sell the statue at auction on 14 May 2018 – the statue was prominently displayed on the cover of the auction catalogue. The day before the auction, the Greek Minister of Culture sent a letter to Sotheby's demanding it return the statue to Greece. Greece believed the statue was illegally exported in the past. Sotheby's argued that the work was sold at auction in Basel in 1967, thus meaning the 1970 UNESCO Convention would not apply. On 21 June 2019, the judge rejected Greece's effort to dismiss the lawsuit on jurisdictional grounds (Stempel 2019). This case may have implications on the way that a state actor will seek the return of cultural property for which it believes it has a claim. If the court ultimately rules in Sotheby's favor and holds Greece liable for interference with the sale, other countries may be on notice about the risks of asserting such repatriation rights. Countries will need to be more attuned to the potential for legitimate counterclaims – and the costs of defending against those claims – in other jurisdictions. Thus countries will have to balance the potential return of the item with the possibility of no return coupled with the expenditure of resources for defending the claim.
16. The Elgin Marbles were taken from the Parthenon in Athens between 1801 and 1805 and then sold to the British government for display in the British Museum in 1816. At the time of writing, the latest development was the 2015 decision by the Greek government to pursue diplomatic avenues rather than bring suit in International Court (Munro 2015).
17. The nation and its local communities can then decide how to use the funds, whether to build a museums, to commission new cultural monuments, or to pay for economic development or investment in entrepreneurship broadly. These projects could range from infrastructure and food security to personal dividends (in the manner of Norwegian sovereign wealth payments to citizens) to funding for local cultural projects including education, newly commissioned monuments, or educational institutions. For highest value or most significant works, this process could be structured as a 'draft pick' in rounds, or the parties could negotiate groupings of objects. These efforts dovetail with existing blockchain initiatives such as UNICEF and the World Bank's initiatives to create blockchain-registered self-sovereign ID cards for refugees. A cultural dividend could be transferred onto this refugee banking system, which currently is designed to allow refugees to use their self-sovereign ID cards, with retinal scanning, to purchase groceries in aid camps (Baydakova 2018). In cases where the revenue share goes into a museum building fund, international bodies such as UNESCO or ICOM (the International Council on Museums) can work with the stakeholders to agree condition and planning budget for the museums. In the same way that token purchasers are quasi-philanthropists in the new museums, architects and project managers could donate time to the projects.
18. There is a long history of museums being placed in ethically complex positions as stewards of stolen objects. When two Turner paintings belonging to the Tate were stolen from an exhibition in Frankfurt, Germany, Sandy Nairne labors to return the works included some negotiation with gray-market intermediaries (Nairne 2011).
19. Speculatively, one could also apply here an idea developed by Barak Ben-Ezer with regard to the poaching of endangered animals such as lions and tigers. Ben-Ezer proposed that instead of buying a Cryptokitty – a digital, investible 'non-fungible' blockchain token – one could buy shares in a real cat – an endangered animal. A portion of that token could be owned by the local community, either for the benefit should a work be sold or acquired and to include the local community in the upside of protecting the work. Elements of personal safety would of course need to be considered in application of such a plan. But all of these proposals draw on the logic of the Coase Theorem that property rights (1960), once assigned, can be handled by markets, as long as transaction costs are not too high. We simply assign property rights to what matters – here oversight and protection of work, registry of objects, and permitting of sales – to set limits to quantity and allow markets to set price accordingly.
20. The politics of the process of how this structure evolves is also important. Thinkers such as Augusto Boal (2002 [1992]) and Freire (2000[1972]) offer methods of non-hierarchical interaction which would be well used here. Advisors could suggest a division of proceeds but it would also be important to amplify the source country's and source country's community's views on how to design these outcomes. For the management of antiquities, it would be particularly important that stakeholders could choose the privacy or intentional public reach of the records, following from the tenets of Local Contexts, mentioned above. In addition, those stakeholders would want to presumably have some autonomy in the choice of platform. Some blockchain platforms are white-label products run by large companies, and nation-states and other bodies may have strong opinions on choice of blockchain platform.

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