

Use Case : Art forgery is a major problem for the art market:

https://en.wikipedia.org/wiki/Art_forgery

- Explain the problem and mention current solutions.
- Describe the advantages and disadvantages of using a blockchain solution
- Design a network to help the art market. Think about Peers, CA, Channels and Smart Contracts. Make a critical analysis.

Current problem and existing solutions

Art forgery - Art forgery is the creating and selling of works of art which are falsely credited to other, usually more famous artists.

Below are some of the ways of doing forgery

- Sometimes, an original item is borrowed or stolen from the owner in order to create a copy. Forgers will then return the copy to the owner, keeping the original for himself.
- Forgers would create false paper trails to make the art work genuine.
- Dealers would try to make profit on a forged art by selling it as genuine.
- Some times, dealer would withdraw the forged art and quietly returns it to owner, thus giving him an option to sell elsewhere.

Current Problems: Two of the bigger problems in the art work is to establish

'Authenticity' and 'Provenence'.

- Establish the provenence of the art work :
Provence refers to the ownership history of the artwork. Its trail of the ownership which leads to the artists who created the art work. Currently, provevnce is mostly managed manually by the current owner who has to maintain trails of all the previous owner's record.
- Establish the authenticity of the art work
- photographic forgery - The possession of the photo-negatives would allow a forger to print an unlimited number of fake prints, which he could then pass off as original. Fake prints would be nearly indistinguishable from originals, if the same photographic paper was used.

Existing Solutions : Below are the ways to detect the art forgery

- Determines the art work provenence. If item has no paper trail then its most likely forged work.
- Thorough examination of piece to understand artistics tool and methods used and comparing it with the time line of original artist to determine the authenticity of art.
- Forensic authentication
- Digital authentication

How Blockchain can help

Blockchain can be used to maintain a single source of truth which is immutable and decentralized. It can be used to capture each and every authorship and ownership records of the artworks as a block along with current timestamp and other necessary details. Thus, any one can verify and track every movement of the artwork leading to its provenence.

Physical artwork:

One way is to use NFC chip in the artwork and let it stores the private key and stores public key on to blockchain. With this model, any one can scan the chip to ascertain the authenticity of the artwork.

Digital artwork:

Second way is to leverage third party solution of using digital token as a representation of the art work.

Artist has to send the pic of the artwork with all the associated info to these copmpanies to get the digital token. These art details are captured as a block in the blockchaina nd this digital token represents the 'certificate of authenticity'. When artwork is sold, artist transfers the digital token along with the artwork to the new owner. This transaction is digitally recorded as a seperatwe block in the blockchain.

Advantages and disadvantages of using a blockchain solution.

Biggest problem in ArtWork

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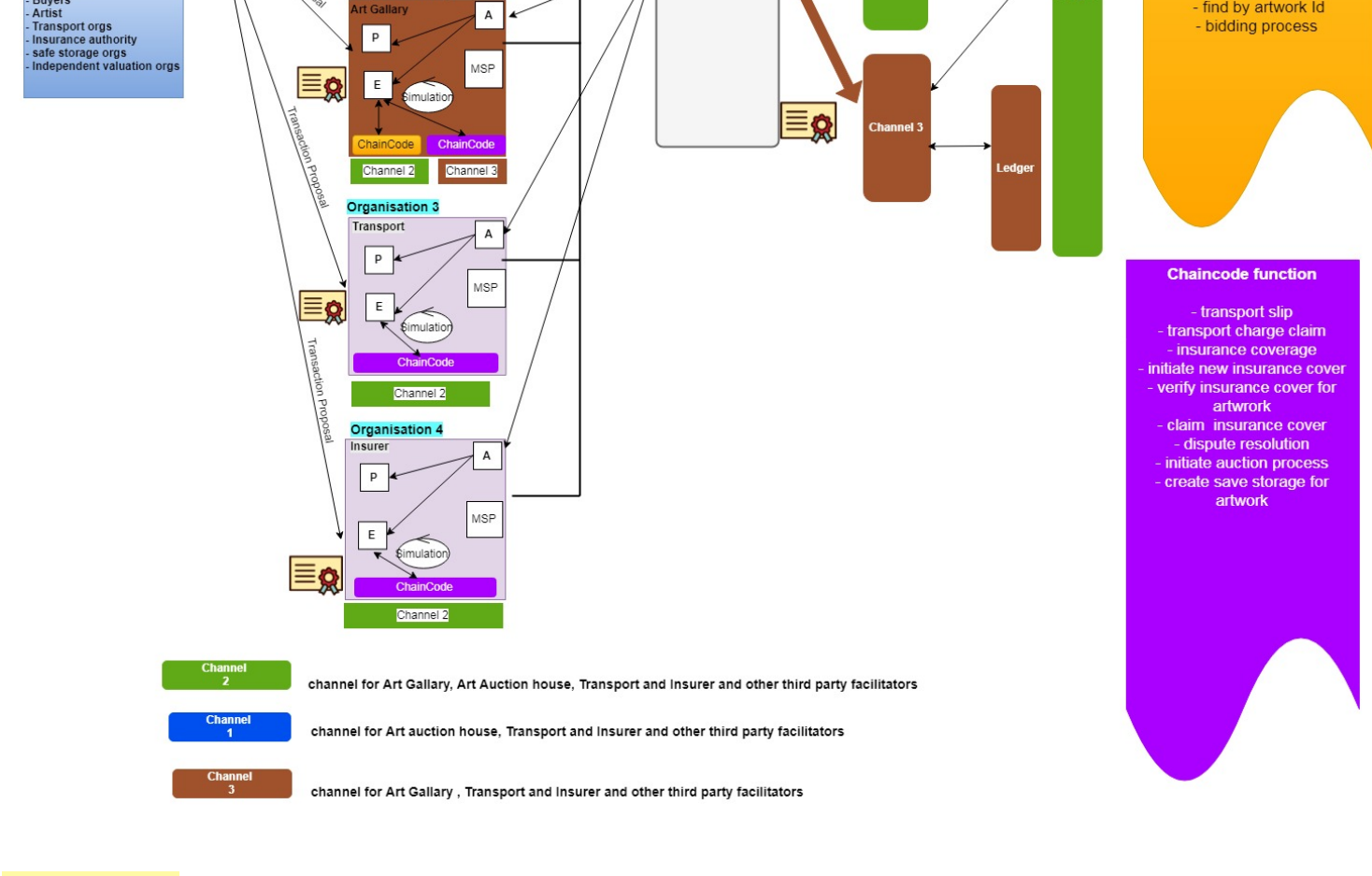
Advantages:

- Provides provenence : Blockchain can be used to maintain a single source of truth which is immeutable and decentralized. It can be used to capture each and every authorship and ownership records of the artworks as a block along with current timestamp and other necessary details. Thus, any one can verify and track every movement of the artwork leading to its provenence.
- provides financial gain to Artist : Currently, an artist only makes a profit when they initially sell a piece of artwork. Auction house drives up prices to get profit but does not pass the profit margin to artist. But by registering the art work with blockchain, artist would have the ability to get the profi margin for each of the sale.
- Democratization : At the moment, only someone with vast wealth can buy and collect expensive artwork. But registering it on the blockchain allows for fractional ownership. Thus a costly art would have thousands of investor who holds fraction of margin in the art and can trade on its value over time.
- Allow financial strength to art museam - Democratization can also help art museum to finance the new art works by auctioning off shares of their existing collection.

Disadvantages :

- Blockchain adoption would directly impact all the middleman like auction house and galleries, who makes huge profit from the artwork sale. Right now, auction house drives up the art work prices drastically to get the profit . After blockchain implementation, on a mutual agreement, they have to share the profit with the artist and other entities too.

Design a network to help the art market.



Correction :

In the above network diagram , Organisation 3 and Organisation 4 would have access to ALL the channels. This will allow these two organisation to collaborate with other organisations (Org1 and Org2) in their respective channels.

There are so many aspect to consider to propose this network. In this diagram, my main focus is to capture the high level market behavior that focuses on provenance, protection and authenticity of digital artwork, digital representation of physical art works and art auction.

I have considered 4 organisations, two chain codes and three channels.

Each organisations have their own Certificate authority and each peer roles and policies are defined inside MSP.

I have defined three channels.

- Channel 1 is defined only for Auction house and facilitators.
- Channel 2 is defined for all the actors in this network. This is useful for the coordination and sync between auction house and galleries. Couple of use cases that would be facilitated by this channels are
 - Gallery buy the art work from Auction house
 - Gallery insured their art works and transport their art works for auction to the auction house
- Channel 3 is defined only for gallery and facilitators.

Below are high level details of the organisation.

Organisation 1 : Art auction house :

- They facilitates in art auction process. Their scope of operations includes :
 - Art provenance - rely on trusted organisation to ensure physical art work provenance, authenticity and past owner details
 - Arrange for insured and safe transportation - bring art works to their ware house
 - Art valuation - independent art work evaluation and valuation
 - Facilitate end-end art auction process.

Organisation 2 : Art Gallery :

- They promote their own set of artist and their art works
- They do buy artworks based on the prevalent customer choice and social taste
- Art provenance - rely on trusted organisation to ensure physical art work provenance, authenticity and past owner details
- Arrange for insured and safe transportation - bring art works to their ware house
- Art valuation - independent art work evaluation and valuation

Organisation 3 : Transport :

- They facilitate in artworks transportation.

Organisation 4 : Insurer :

- They provides different kind of insurance to the art works. Couple of insurances are safe transport insurance, safe storage insurance ..

Chain code 1 (Yellow) : All of its functionalities are tailored to create, maintain and authenticate the artworks and actors in this network. It provides below functionalities

- Create actor - Each participant in this network will have an unique identity. This network supports below actors
 - Art Gallery representative
 - Art dealers
 - Art auction house representative
 - Collector
 - independent Buyers
 - Artist
 - Transport organisation representative
 - Insurance authority representative
 - Independent Valuation organisation representative
 - Storage organisation representative
- Create artwork certificate - Based on unique parameters, create the artwork certificate.
- Generate art hologram - This will help to authenticate the physical art work with its corresponding certificate.
- Update artwork Owner
- Update artwork certificate owner
- Verify provenance
- verify certificate
- verify hologram
- Get art work history
- get art work current status
- find by artist ID
- find by art work Id

Chaincode 2 (blue/pink) : All of its functionalities are designed to supports facilitators in the art market and allow them to actively participate in this network. Below are list of identified facilitators

- Transport organisation representative
- Insurance authority representative
- Independent Valuation organisation representative
- Storage organisation representative

Below are supported functionalities

- Transport slip - Contractual receipt between transport Org and auction house, gallery or artist
- transport charge claim - Once the transport is successfully done, transport org can claim it. This will be bound through chaincode as a smart contract
- Insurance coverage - Provide insurance coverage for the art work
- Insurance claim - Based on certain parameters, other party can claim it. These conditions are bound through smart contract code in chain code.
- Verify insurance cover for art work
- Dispute resolution - chain code functionalities
- Create save storage for art work