



89 seconds Atomized

White Paper

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Introduction

This white paper is intended to introduce the artistic, technologic, and commercial background of Snark.art's inaugural project, **89 seconds Atomized**, by Eve Sussman. Please note that this white paper, like the piece itself, is a work-in-progress. We will update this document — particularly the technical elements — as our behind-the-scenes work progresses, community engagement develops, and **89 seconds Atomized** grows into a completely new experience.

Concept

Artist Eve Sussman is working with Snark.art to offer an original Ethereum-based artwork, shattering her last artist's proof of the acclaimed video piece **89 seconds at Alcázar** (edition of ten and two artist's proof) into 2,304 squares (or "atoms", which can be individually purchased. The resulting blockchain-based artwork, **89 seconds Atomized**, can be collected by a group of new owners, who are empowered to reassemble the full video at will.

Background

About Eve Sussman

Eve Sussman is a Brooklyn-based artist and filmmaker. In the course of her career, her work has pushed the boundaries of cinematic experience, compelling viewers to actively participate in the invention of the story. Her algorithmically generated film, **whiteonwhite:algorithmicnoir** edits live, never repeating the same way twice. Sussman's collaborations with Simon Lee, **Car Wash Incident**, **No food No money No jewels** and **Collusion play** with innuendo and implied of narratives, doublespeak and dialogues channelled from infamous personalities. Sussman's work has been shown in institutions and film festivals internationally, including The Smithsonian American Art Museum, the Reina Sofia in Madrid, The Museum of Modern Art in New York, The Whitney Museum in New York, The Louisiana Museum in Denmark, The National Gallery in London, Leeum Museum in Seoul, and Musée d'art Contemporain de Montréal, the Sundance Film Festival, the Toronto International Film Festival and the Berlinale.

About Snark.Art

Snark.art is a blockchain laboratory exploring creative and commercial possibilities in art. Founded in Williamsburg, Brooklyn in early 2018 by Andrey Alekhin and Misha Libman, Snark.art uses the power of blockchain to change the way art is made and collected, as both a platform for established artists to experiment and a marketplace for collectors.

About Las Meninas

A landmark in the history of European art and thought, Diego Velázquez's painting **Las Meninas** (1656) is a vertiginous experience — a painting about the act of painting; a portrait where the subjects are barely perceivable flickers. Ostensibly a depiction of the Spain's King Philip IV and his wife Mariana of Austria, the royal couple are only visible in a small mirror on the back wall.

Instead the painting depicts Velázquez himself, alongside a group of assembled courtiers and the Infanta, as he paints a portrait of the monarchs. The point of view is that of the king himself — the cosmic, spiritual, and political axis of the universe.

In the intervening 350+ years, **Las Meninas** has become a touch point for endless aesthetic critique (Michel Foucault describes it as an image "in which representation is

represented at every point”) as well as an ever-expansive artistic inspiration (John Singer Sargent painstakingly copied **Las Meninas** as a study; Pablo Picasso reinterpreted the piece over a series of 58 canvases).

About **89 seconds at Alcázar**

As reimaged by Eve Sussman in **89 seconds at Alcázar** (2004), the painted image of **Las Meninas** becomes just one frame in a meticulously choreographed, ten-minute faux cinema verité video.

After an archival dive into the specific circumstances and surroundings of Velazquez’s canvas, Sussman recreated the royal salon in a Brooklyn warehouse. And working with a team of 35 (cinematographer, architect, costume designer, and actors (including Peter Dinklage) among them), she transforms the moment captured in **Las Meninas** into a 360-degree live-action vision of artistic creation.

Today, **89 seconds at Alcázar** is in the collections of the Whitney Museum, the Museum of Modern Art, and Seoul’s Leeum Samsung Museum, among others.

One remaining artist’s proof of the piece remains in Sussman’s possession — it is that piece which will be used for her upcoming work with Snark.art.

89 seconds, Atomized

So where do we go from here? Right this way...

The Work

89 seconds, Atomized is a blockchain-specific art piece that represents an entirely new step in the remarkable afterlife of **Las Meninas**. Where **89 seconds at Alcázar** sought to enter the frame of the painting itself, **89 seconds, Atomized**, dives into the the pixels of video itself.

Sussman, along with Snark.art's technology team, will digitally "shatter" the archival print of the video into 2,304 atoms, each one a 20x20 pixel square that will contain a visual segment of the full ten-minute video piece.

Each of these squares will then be registered on the ethereum blockchain as a digital token that cannot be duplicated, but can be freely traded or sold.

Snark.art will sell each of these atoms for USD (or the equivalent in ETH) through a series of international sales. These art pieces will be transferred to owners' digital wallets, a simple process that Snark.art facilitates for the tech-averse via its website.

Each 20x20 pixel atom is itself a unique piece of art that can be viewed irrespective of the whole. Collectors can view their pieces on Snark.art, with full sound accompaniment; they will also be able to explore different options for experiencing the piece, whether through VR, smartphone, or Zune.

The Community

While each video atom will be a one-of-a-kind, induplicable art piece, we believe that the work — both individually and collectively — becomes truly meaningful, and extraordinary, in the community that it creates. And offering a unique mode of shared ownership will give the artwork a second life, allowing it to be far more accessible to a general audience, as well as evolving the meaning of the piece itself.

Owners of a piece will be naturally incentivized to to borrow other owners' pieces or lend their own video atoms in order to facilitate screenings of **89 seconds, Atomized** in venues around the world.

Of course, some pieces may be lost over time, or certain owners may not wish to participate in screenings — as a result, the video image itself becomes a kind of mosaic, where the viewer is asked to fill in the blanks from missing elements. We are also anxious to explore how the community will deal with these developments, and the new ideas that will emerge from this process.

While we have not yet finalized the exact specifications of the lending process, the entire process will be enforced and secured via Ethereum's smart contract protocols. The parameters of any loan will include a start date, end date, as well as the possibility for a loan offer price.

Every owner of a piece can use this function to request a temporary loan of all 2,304 pieces (or some fraction from their respective collectors). Loans can be either complimentary or include compensation. Once pieces are loaned a collector for a specific duration, that individual could then complete the video puzzle and screen 89 seconds (whole or partial) for the duration of the loan.

Initially, Snark.art will reserve the right to automatically loan a piece from any owner for the period approximately 20 days per year in order to organize public screenings. However each collector will have the freedom to terminate such loans prior to the expiration of the art loan. As soon as it becomes clear that the community itself is actively organizing screenings, Snark.art will begin limiting its role in facilitating screenings and its ability to loan.

Purchase and Ownership

Initial Sales Drops

At launch, collectors can purchase atoms that will be sold face-down and from a random location in the frame.

If a collector purchases ten atoms, for example, these atoms will most likely be distributed all over the larger video frame. In the secondary sales market, however, collectors will be able to trade, and buy, new atoms in an effort to consolidate their atoms, if they choose.

Atoms will be distributed in drops of 200-400. However, some collectors will be able to reserve atoms during the presale process, pre-paying for their atoms, which will then be distributed when the official sale period begins.

Purchase Methods

We anticipate that pre-order, and regular sales, will be available for customers using either credit cards or crypto payments. Customers who use a credit card to purchase atom(s) must provide an Ethereum wallet address in order to receive their atom(s), however. We are exploring a variety of options for distributing atoms to credit card purchasers, among them deep links and paper wallets.

Loan Mechanics

Requesting a Loan

When a collector requests a loan, that request is programmed to go out to all atom owners (up to 2,304 individuals or institutions). That request will contain several parameters: the loan's start date, the loan's duration, and the fee offered for the loan (where applicable). That fee will then be divided by 2,304, and the resulting amount will be offered to each owner based on the number of atoms owned.

Loaning Out Your Atom(s)

When a loan request is made by Snark.art, all owners that have agreed to participate in screenings during the initial sale will have their token automatically transferred to Snark.art at the start of the loan. If owners do not want to have their atoms loaned automatically, they will have the ability to approve each loan manually.

When a loan request is made by a collector, all owners that have agreed to participate in non-Snark.art screenings during the initial sale will automatically send their tokens to the borrower at the start of the loan. If owners do not want to have their atoms loaned automatically, they will have the ability to approve each loan manually.

Cancelling a Loan

Regardless of whether or not a loan has been approved manually or automatically, any active loan can be cancelled at any time. However, if a fee has been received as part of the loan request, that amount must be refunded in order to cancel the loan.

Gas Costs

We're aware that the gas costs incurred in lending out the atoms of **89 seconds, Atomized** could prove significant. Therefore it's our hope that owners will be willing to loan their atoms without payment, and that screenings will be publicly/community accessible.

Viewing Your Atoms

Once owners have purchased and received their atoms, they will be able to view their atoms on the Snark.art platform. We are creating a custom player that will allow individual owners to see each of their atoms play simultaneously. And when someone requests a loan from other owners, aggregating the tokens in a single walled, the player will allow the borrower to view all the borrowed atoms play together. The video player will be released within two months of all atoms being sold.

We also hope that the community of owners will work on creating their own players and tools to allow 89 seconds Atomized be played and enjoyed outside of Snark.art platform. We also anticipate that a new generation of wallet apps will permit individual atoms to be played within mobile wallets, as well as smart devices such as Apple TV, Chromecast, etc.

Royalties

The artist receives royalties from future sales of the work only if the artwork is sold at a profit. Snark.art will charge a small fee for using our platform to sell the atom, but any remaining profit is subject to royalties.

Eve Sussman|Rufus Corporation will receive a royalty payment of 15% of profit on any sale following the primary sale, paid in Ether. Snark charges a 5% processing fee for using its platform to sell a token in our marketplace. Example: a collector purchased an atom for 1Ξ (Ether) and later sells that atom for 101Ξ.

After deducting the Snark processing fee of 5% (5Ξ) the net profit is 95Ξ. 15% of 95Ξ (14.25Ξ) is the royalty payment deducted from the sale. The bulk of that royalty payment will go to Sussman and the remainder to Snark.art

The atom's seller receives 81.75Ξ (101Ξ - 5Ξ - 14.25Ξ) from the sale. If the atom is sold without any profit, then royalty is not paid, as it will be 15% of nothing.

The Tech

Things get a little heavy here, especially for the technically disinclined. If you have any questions or need further clarity, please don't hesitate to get in touch with us.

Video Transfer

Source Material

The source video for **89 seconds Atomized** (the final artist's proof of **89 seconds at Alcazar**) runs 9 minutes and 44 seconds (despite what the video's title might suggest), encoded using the H.264 codec at a resolution of 1280 x 720 pixels, with two-channel audio.

Sussman experimented with several different resolutions for the atoms, from 10x10px to 40x40px, before concluding that an atom of 20x20px would work best as a stand-alone artwork — achieving the desired level of abstraction in each atom, while still containing sufficient detail to make sense of shapes and shadows as the video plays.

Atom Creation

The resulting atoms run the full 9 minutes and 44 seconds, are encoded using H.264 codec at a resolution of 20x20px, with two-channel audio.

In generating the atoms, we're working to ensure that video quality, color accuracy, sound duplication, et al., are as true as possible to the source video. We're doing this through several steps:

1. Sussman manually generated several atoms herself, carefully managing the process and resulting videos.
2. The team at Snark.art is using those atoms as a gold standard for quality control, ensuring that the algorithmically-generated atoms match those of the artist's.
3. Once each atom has been generated and assessed, those 2,304 atoms will be re-assembled into the full video frame. Snark.art and Sussman will then assess the quality of the resulting video against the artist's proof to ensure that color, sound, and quality match.

Encryption and Tokenization

Encryption

For the encryption algorithm to ensure both digital scarcity and accessibility, we started out with two requirements:

1. The algorithm must use asymmetric encryption to allow new owners access to viewing the video, while also locking out previous owners from screening the atom.
2. The encryption must be platform-agnostic. We intend to place decryption instructions on IPFS to allow future collectors the ability to decrypt the atoms without going to Snark.art. Collectors should be able to view the atoms that they own simply by using the private keys to their wallet.

In launching 89 seconds Atomized, we're defaulting to a more centralized method of encryption/decryption; however, we hope that over time these processes will be revised to become increasingly decentralized.

Data Storage

Once encrypted, all 2,304 tokens will be uploaded to IPFS (aka InterPlanetary File System), an open-source, peer-to-peer storage network. The data will not be stored on the

Ethereum blockchain itself for one simple reason — it's way too big. The file size of the full **89 seconds at Alcázar** is about twice the current size of the entire Ethereum blockchain. Storing data on the Ethereum blockchain, it should be said, can also prove prohibitively expensive.

Metadata

The following metadata that will be contained in each atom:

- Artist, Name of Artwork
- Hash of the atom
- Location of the atom in the grid
- URL of the artwork location on the IPFS
- URL of the terms of sale and any licenses on the IPFS
- Participant wallets and their % of revenue (ex. artist 90%, Snark.at 10%)
- Percent of profit shared with participants from secondary sale

ERC721 Smart Contract

Each atom of 89 seconds Atomized will rely on functionality provided by our contract components:

- **Snark Base**
A basic handler, this contains various functions, events, and base variables related to tokenization, structuring, and information retrieval from created tokens

- **SnarkOfferBid**
A simple protocol for the offer/bid/sell process, this contains functions related to the creation, acceptance, and withdrawal of bids and offers
- **SnarkLoan**
This contains functions related to the creation, acceptance, and withdrawal of loaned atoms. This contract also handles events such as loan cancellation and sales restrictions during a loan.
- **SnarkERC721**
Defines the functions that allow ERC721 non-fungible tokens to be managed, owned, and traded
- **SnarkStorage, iSnarkStorage**
These components separate data storage from the logic layer, allowing us the flexibility to upgrade the smart contract without losing any storage data
- **SnarkDefinitions, Migrations**
SnarkDefinitions defines sale state and sale types. Migrations helps deploy contracts to the Ethereum network.
- **SnarkBaseLib, SnarkCommonLib, SnarkLoanLib, SnarkOfferBidLib**
These libraries act as support to their respective contracts. Because libraries are deployed as separate

entities on the blockchain, with a separate address, we can implement all internal functionality as part of the library, while also splitting functionality across more than one library. This also allows us to limit the size of the contract.

Potential Roadblocks

We are experimenting with new technologies and new modes of interaction to bring **89 seconds Atomized** to life — as a result we are anticipating a variety of possible roadblocks, both foreseen and not. However, we are also hopeful that any problems that arise will be remedied by our in-house team of technologists, as well as an engaged community.

Two potential roadblocks that we anticipate:

The ability and willingness of the community to engage with, and arrange public screenings of, 89 seconds Atomized

To facilitate community engagement, we are building in the ability for owners to automatically approve the loans of their atoms, a process that will hopefully expedite public screenings of 89 seconds Atomized. Initially, Snark.art will take the lead in organizing and facilitating these screenings, but over time, we want to hand over as much control as possible to the community of owners.

The technical constraints of the audience

There is no doubt that blockchain has become lingua franca for an increasingly large group of technically-inclined individuals. However, for a general audience, as well as the arts community, we are conscious that purchasing a piece of blockchain-based art could prove to be a significant hurdle.

That element was crucial to our decision to open up purchase of atoms to credit card purchasers. We also believe education will be crucial to bringing users on-board, and plan to offer as much information as possible to make the project accessible to our entire audience.

That said...

Naturally there are risks involved; any artistic or technological endeavor that takes no risks probably isn't worth undertaking. But we are confident that the potential rewards of **89 seconds Atomized** -- introducing the unbounded possibilities of blockchain to the artistic community, as well as helping to advance a still nascent technology -- far outstrip the perils.

Potential roadblocks aside, we are enormously excited to follow **89 seconds Atomized** wherever the community and the art take us. We hope you're interested in joining us on this endeavor — if you have any questions, please contact us at hello@snark.art and we'll do our best to offer some clarity.