

# Introducing Sagaverse

Attribution protocol, player and platform

for rich media NFTs

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## **Abstract**

*Rich media and promotion of derivative works to first-class citizens of Web3 provides new opportunities for creator monetization. This requires rethinking the role of the media player and traditional content creation pipelines. We present a possible solution to problems currently facing content creators by the extension of NFT standards to comprise attribution and licensing information, and the introduction of a new rich media player, -editor and -format native to Web3.*

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# Problem statement

In 2021, video accounted for more than 82% of all internet traffic<sup>1</sup> (up from 67% in 2016.) Approximately 2 billion people will watch a total of 3 trillion minutes per month.<sup>2</sup> More people are creating content and streaming video than at any point in history.

Yet, while it has never been easier to create with video, it's still difficult for creators to earn money. It is estimated that out of every streamer that makes money on Twitch, only 2.96% make enough to make a living, representing only 0.57% of all Twitch streamers.<sup>3</sup> The problem is systemic across platforms. Only 2% of creators on Patreon earn the minimum wage. On Spotify, an artist makes 4 USD per every 1 000 streams.<sup>4</sup> A video with 100 000 views will make between 500 and 2 500 USD on YouTube.<sup>5</sup>

The problems faced by independent content creators on Web2 platforms have caused a migration to Web3 platforms where they can own their content themselves and monetize it without a third party involved.

The most common way for creators to monetize their content on Web3 platforms is to list their creations as Non-Fungible Tokens (NFTs) in a set number of copies as part of a collection, first enabled by the ERC721 standard<sup>6</sup>. Since then, there have been proposals enabling royalties, where the original creator is attributed and credited a set % royalty on future sales of the tokenized asset<sup>7</sup>. However, this alone does not provide a way for content creators to be credited based on usage of their original content in derivative works, and hence derivative content is still *prevented* rather than *encouraged* on the Web3 platforms of today.

This leaves out a growing proportion of content creators, who instead of making original content from scratch rather spend their time making remixes, highlights, supercuts, compilations and juxtapositions of existing content. Preventing this type of derivative content from being monetized - or conversely - allowing monetization while not crediting the original creators, hampers fandom and prevents prosumer economies from prospering.

This is a missed opportunity. To leverage the value created by derivative works, monetization should utilize a revenue sharing model taking into account how source assets contribute to derived assets.

The tools at the hand for the prosumer today, however, inherently break the connection back to the source assets. This loss of information is problematic for an equitable distribution of

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<sup>1</sup> Video will account for an overwhelming majority of internet traffic by 2021. (2017, June 12). Business Insider. <https://www.businessinsider.com/heres-how-much-ip-traffic-will-be-video-by-2021-2017-6>

<sup>2</sup> Cisco Annual Internet Report. (2020, March 9). Cisco.

<https://www.cisco.com/c/en/us/solutions/collateral/executive-perspectives/annual-internet-report/white-paper-c11-741490.html>

<sup>3</sup> Analysis of data from Twitchtracker (2022). <https://twitchtracker.com/statistics>

<sup>4</sup> Streaming Royalties Calculator (2022). Musicgateway. <https://www.musicgateway.com/royalties-calculator>

<sup>5</sup> Amanda Perelli (2021, March 4). How much YouTube pays influencers for 100,000, 1 million, and 150 million views, according to top creators. Business Insider.

<https://www.businessinsider.com/how-much-youtube-pays-for-views-100-thousand-million-150-2020-1>

<sup>6</sup> ERC-721: Non-Fungible Token Standard. Ethereum. <https://ethereum.org/en/developers/docs/standards/tokens/erc-721/>

<sup>7</sup> EIP-2981: NFT Royalty Standard. Ethereum. <https://eips.ethereum.org/EIPS/eip-2981>

revenue generated by the derivative work, as evident by some Web2 platforms deploying novel AI-based solutions for the sole purpose of attempting to re-establish this link.

Such an approach is not sustainable and can only be implemented by a few large actors. Further, asset ownership and licensing models on such platforms is largely determined by opaque centralized content licensing cartels, rather than leveraging the new decentralized model of content ownership that has become a hallmark of Web3.

Just like traditional content licensing applies across borders and distribution platforms, a decentralized solution to this problem needs to work across blockchains. Specifically, an NFT minted on one blockchain needs to be able to reference NFTs minted on other blockchains, and the attribution and licensing information for an NFT should be agnostic to the blockchain it is minted on.

NFTs have a huge potential beyond just “digital collectibles”. However, to make the prosumer a first-class citizen of Web3 requires more than just extending the NFT protocols of today.

Maintaining attribution in derivative content and ensuring licensing rights are honored requires rethinking traditional content creation pipelines as a whole. The merging of consumption and creation also means the *media player* takes on some of the tasks traditionally found in external tools and pipelines.

New forms of rich media content also need to be seamlessly integrated into the content creation pipeline. This is the type of content where traditional "plain" media formats have proven *too limited*: They lack support for interaction and new content types, and embedding is always lossy. HTML solves some of these issues, but ends up on the other side of the spectrum being *too general*; it is a poor fit for time-based media, lacks the kind of editor support expected by creators of plain media, and suffers from limited composability and ever growing fragmentation.

Finally, the duplication of data and re-encoding that typically happens when an asset is used in a derivative work puts an unnecessary strain on the environment and forces hosting providers to essentially host the same data over and over again. Making the prosumer a first-class citizen of Web3 means distributing *the composition* as a first-class asset, thereby avoiding some of the problems caused by encoding and distributing traditional video.

In summary:

- There is a need for a lossless and rich - yet editable and composable - media format
- The link between assets and their derivatives needs to be preserved
- A cross-chain source of truth for asset attribution and licensing information is needed
- Maintaining such a model needs to be automatic and integrated into a rich content creation pipeline
- Honoring such a model needs to be automatic and integrated in a rich media player
- The merging of consumption and creation means the media player itself becomes part of the content creation pipeline

# Proposed solution

NFT protocols enable a unified programmatic licensing rights layer, offering an alternative way of solving monetization, where the inherent utility of the internet can be used as an advantage.

To achieve this, we are proposing a solution that allows users to consume and create rich interactive audio-visual content and monetize its usage in derivative works, in addition to traditional one-off sales transactions.

Our proposed solution can be broken down into four parts:

1. An extension to existing NFT standards, linking each NFT to a standardized cross-chain *asset attribution manifest*
2. An open and extendable *format for rich media*
3. A *rich media player* allowing the creation of derivative works while maintaining the attribution information and honoring diverse licensing models defined in the asset attribution manifests
4. A DAO maintaining a cross-platform app and supporting services implementing the above for the end-user, collectively known as the *Sagaverse platform*

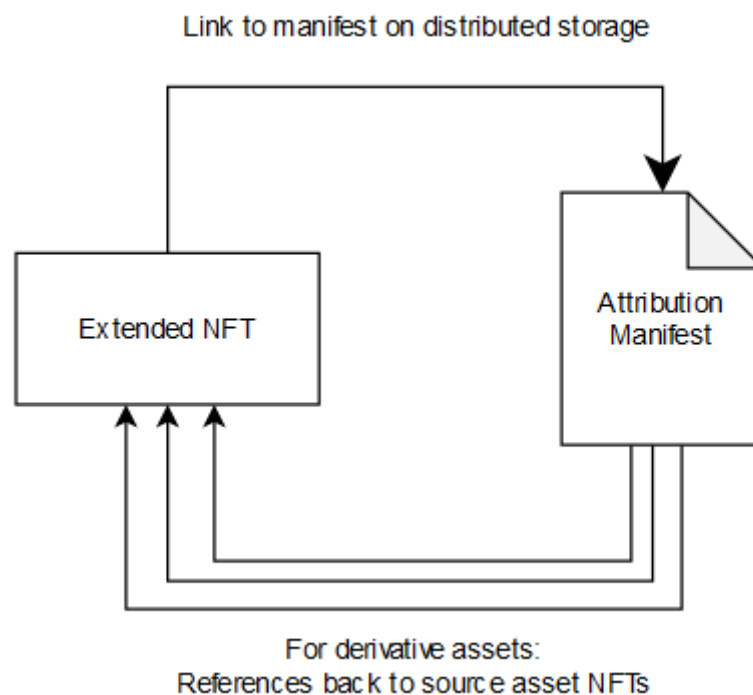
The following sections describe each part of the solution in further detail.

## Asset attribution manifest

Sagaverse will propose extending existing NFT standards by adding to each NFT a link to a standardized *Asset Attribution Manifest*.

This manifest will describe in detail the licensing terms under which an NFT can be used in a derivative work, and in the case of a derivative work it will also contain the information about how other NFTs contribute to the derivative work in question. This enables automatic and transparent implementation of diverse derivative asset licensing- and revenue sharing models.

The manifest itself is a JSON data structure stored on a distributed storage system. Storing this extrinsically allows reuse of manifests between blockchains and circumvents the storage limitations on most common chains. The integrity of the manifest is ensured by content addressing (hashing).



The exact information needed to be stored per manifest (and per contribution per manifest) depends on the specific revenue share model implemented by the platform. For instance can such a model distribute revenue based on how much of the contributing work is used in the derivative work. Further, this can be combined with rich playback insights data for an even more equitable sharing of revenue generated by the derivative work.

Through the evolution of the Sagaverse platform, we will develop and standardize transparent revenue sharing models anyone can adopt, and propose standards for how the necessary information should be encoded in the manifest.

## Rich media format

Sagaverse is developing an open rich media format for the Web3-era, called *m3*.

Similarly to HTML, this format supports recursive composition of *elements* of various types, including traditional video, pictures, text and audio. However, as opposed to "free-form" HTML, the proposed format will enforce a set of restrictions making it more suitable for visual composition and clipping commonly found in traditional non-linear video editing software.

A goal of *m3* is to provide a unified way to clip and compose source media into new media, indifferent to the format and richness of the source media.

Further, while the main composition model of HTML is the linear document with complex 2D layout rules, the composition model of *m3* aims to be *simple*, while composing well in *all dimensions*, including time and 3D-space.

### Animation and time

To compose well in the time dimension, animation is elevated to a core concept of *m3*.

In addition to attribute animations, elements have an offset and duration in time, and all animations are relative to an implied stateless per-element timeline. By default, this timeline is synchronized with the timeline of the parent element, but the parent element is also free to override this, allowing clipping and various playback effects.

For instance, any source media can be non-destructively cut into smaller pieces and then recomposed. The source media can also be played at different rates or in reverse, and the playback could even follow a custom pattern by animating the playback position and rate in the containing element.

This simple model covers a wide range of use cases common to modern video editing, while allowing recursive composition of both rich and plain media.

### Multi-dimensional content

While all elements compose in the time dimension, each element type can be categorized by the additional dimensions it composes in: *Visual elements* compose in 2D (such as a video, text), *Spatial elements* compose in 3D (such as meshes, point clouds, cameras), *Audio elements* compose audio only.

The transition between visual composition and spatial composition happens in two ways: Any visual media or element can be used as a texture map on spatial elements, and any spatial media or element can be shown inside a visual composition by using a *Viewport* element. This makes composing 2D media inside a 3D world as easy as embedding 3D scenes inside a 2D composition, which is crucial for augmented reality use cases.

However, the dimensionality of rich media does not end here; we envision a future where rich media goes beyond just what can be presented on a screen. For this reason the m3 format can be extended with new element categories as we explore the space of rich media.

As an example of this, *haptic elements* could be introduced to allow haptic feedback in a VR setting; another example could be general purpose *signaling elements*, allowing an EDM act to embed signaling instructions for lights and other stage equipment along with the NFTs for their tracks. Other composable element types one can imagine includes geographical elements, musical elements, lyrical elements, etc.

Non-media assets such as fonts, filters, emoji packs, PBR materials and effects will also be first-class citizens of Sagaverse, allowing creators of such resources to also take part in the same NFT-based revenue sharing model.

It is *not* the goal of Sagaverse to replace existing asset formats and creation tools, but rather to provide a unified way of composing, redistributing and monetizing the various asset types that make up rich media.

## Interactivity

Interactivity and rich media goes hand in hand in a multitude of ways, and will hence be part of the m3 standard.

In its simplest form, elements of a composition can act as hyperlinks to other content, or in a multi-layered composition they may provide controls for toggling, expanding and filtering information contained within the composition.

Further, what types of interactive playback controls should be enabled can be defined by the rich media file itself. Gesture based zooming, panning and seeking is a sensible default for most traditional media, but for instance in an augmented reality use case, the rich media file may want to define how the user can control the camera.

The proposed format will provide standards for the above mentioned use cases. Going beyond that, Sagaverse will seek to standardize other common features of rich media, such as embedding feedback in the form of polls and comments, including feeds and tickers for rich live streams, etc.

### **Custom logic**

While not part of the initial specification, we see the need for embedding custom logic in rich media. This is a double-edged sword, though: For security reasons this needs to be sandboxed, and key to maintaining easy visual editing with the introduction of custom logic is to keep the logic subordinate to the overall visual-temporal organization of the media format. I.e. all logic lives inside elements, not the other way around.



## Format and streaming support

The m3 format can be encoded either as XML, JSON or in binary (using MessagePack<sup>8</sup>). Sagaverse will release a core specification along with follow up extensions as the format evolves.

Support for adaptive streaming is crucial for a rich media format; in a live streaming scenario playback needs to start before all content has been retrieved from the server. Further, for interactive content there needs to be a way to prioritize fetching the subset of the content that will be visible at a given time within a given viewport. With m3, this is possible because the format is aware of how 2D- and 3D content is laid out in both space and time, and large compositions can be split across multiple files to be retrieved only when needed and at an appropriate level of detail.

In order to allow graceful degradation, the format will have a concept of fallbacks at the element level, such as pre-rendered video in place of a complex but non-interactive composition. The restrictions set by m3 allows such fallbacks to be automatically generated and injected by a third party service, if needed.

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<sup>8</sup> MessagePack: It's like JSON. but fast and small (2022). <https://msgpack.org>

## Rich media player native to Web3

A rich media format is no good without something that can consume and produce it, and an attribution manifest protocol has limited use without something that honors it. This is where the Sagaverse rich media player comes in.

In comparison to traditional media players, only solving playback, the Sagaverse rich media player also handles *interaction* and *editing*; providing a full prosumer experience where remixing and repurposing of existing content is seamlessly integrated with playback.

Further, in addition to being able to open unattributed media files and streams, the Sagaverse rich media player can open and import NFTs with attribution and licensing information as described in the preceding sections, and will ensure attribution is carried along and licensing terms honored when used to create derivative works.

For interactive rich video experiences it is required that the player is capable of instantly switching playback direction and playback rates in a step-less manner. The player also needs agile switching between streams based on available bandwidth and hardware capabilities. The Sagaverse player utilizes a novel new approach to stream decoding to achieve this, described in patent NO346123<sup>9</sup>.

Together, this makes the Sagaverse rich media player *a canvas for the next generation of programmable, interactive visual content*.

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<sup>9</sup> Eike Rösner et al. [VIDEO DECODING METHOD AND DEVICE ENABLING IMPROVED USER INTERACTION WITH VIDEO CONTENT](#) Norwegian patent NO346123, filed 2020.02.05, granted 2022.03.07

## The Sagaverse platform

Sagaverse is developing a cross-platform app that acts as a user-facing front-end for our rich media player and integrates our new approach to derivative content monetization, along with various social features.

The Sagaverse platform aims to be agnostic to content sources and hosting providers, but will build supporting services to index all manifests to generate a hypergraph with source data for analytics, insights, attribution and services to power the Sagaverse platform.

The goal of the Sagaverse app and its supporting services is to provide a complete platform for accessing, creating and monetizing rich original- and derivative tokenized content.

Sagaverse is built as a dynamic mass transaction asset marketplace introducing new monetization attribution and contribution based licensing and monetization models governed by the Sagaverse DAO.

Together, this makes the Sagaverse platform an end to end solution solving creator monetization through a tokenized economy incentivising creation, collaboration, recruitment and redistribution.

Sagaverse is available to end-users, community moderators and developers embeddable on any device, deployed on the major public blockchains and operated by Sagaverse DAO.

## Decentralized Autonomous Organization

The Sagaverse platform is owned, operated and managed by the Sagaverse DAO (decentralized autonomous organization). The Sagaverse DAO is governed by the Sagaverse Governance token holders.

Governance token holders can propose and vote on improvements to the platform.

Until the DAO becomes the governing body of the Sagaverse platform, Sagaverse will be governed by the Sagaverse team based on articles of association built on the following principles:

- Transparency
- Democratic governance
- Users control the platform
- Censorship resistance

The key aspects for governance on the Sagaverse platform are so far identified as:

- Ratification of proposals for the asset attribution manifest standard
- Ratification of proposals for the rich media format standard
- Allocation of tokens from creator and partner pool
- Tokenomics
- Business model
- Community & Creator token allocation mandate

The DAO will be initiated and set up following the public token sale planned for 2023. Further the DAO will be given governing rights over the Sagaverse platform, this will be done after the public token launch.