

# Meseus: The Internet of Attention

## Meseus Team

### Correspondence

Email: [contact@mese.us](mailto:contact@mese.us)

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We present Meseus, a platform for building advanced decentralized recommender systems with incentives, privacy and tokenized personal preferences. Most important features include: a) micro-segmented advertising campaigns with tokenized preferences; b) privacy through mixing and secure computation primitives; and c) proof of relevant consumption and proof of relevance for publishers.

Personal data should not be transacted for free, Meseus proposes a model where you rent access to your data, you have total control of which data and for how long you are sharing it. Meseus is a fundamental piece to build the ultimate recommender system that monetizes all the personal activities and preferences because you will have privacy and market value guarantees.

### KEYWORDS

blockchain, personalization, recommender system, continuous token-curated registries, advertising

# 1 | INTRODUCTION

Following Facebook-Cambridge Analytica scandal, awareness and alarm has grown regarding silos of personal information collected by big tech companies. Alternatives like selling or syndicating your personal preferences are unfit by financial, privacy and security standards.

Our approach involves opening a secure recommender channel for every user where there publishers can leverage an encrypted version of the personal data preferences, such as favorite movies or personal skills. Our disruptive decentralized network of publishers and consumers, preserves privacy and leverages machine learning techniques to generate personalized recommendations. Applications range from job search and movies to boutique wines and luxury cars, and will takeover traditional advertising as soon as blockchain technologies scale to billions of users.

You can reduce Machine Learning to its minimum irreducible elements. You will find that you only need only 3 elements:

1. **Similarity Algorithm:** to do clustering or retrieving nearest neighbors of an item or person, (Unsupervised Learning);
2. **Near-Duplicates Algorithmic:** to detect duplicates when facing a noisy world (Noise Filtering or Equivalency Classes or Clustering);
3. **Reinforcement Learning Algorithm:** to contextualize information and generate actions, use previous examples in new situations (Supervised Learning).

To exemplify these tools, we can analyze an movie example:

- If you like watching horror movies, you want a recommender system to show us new similar horror movies that you haven't watched yet.
- If the system is recommending movies that you haven't watched yet, the system need to detect near-duplicates. For example, maybe you need to detect that "They Live!" and "They Live" are the same movie.
- If you watch horror movies on Fridays and romantic movies on Saturday the recommender system might want to consider new information, learn, when doing movie recommendations. The system may also want to automatically play the movies if it detects that you sat on the couch after 10pm or use another contextual information such as weather. you might also want to get recommendations based what people like us are watching.

Meseus is a decentralized recommender system layer to complete the three aspects of decentralized machine learning.

In the case of Data Science evolution, the next step is Decentralized Machine Learning because you have:

	Personal computer	Network of computers	Trustless Network
Type	Batch Data Science	Big Data Science	P2P Data Science
Example	Enron Email Analysis	Google News	Ethereum Blockchain
Architecture	Single-node	Distributed nodes	Distributed nodes
Control	Centralized	Centralized	Decentralized

So, in the case of the three main components that we need for Data Science, we designed a framework that is decentralized, and each node has enough incentives to collaborate with the network. The final result is the possibility if deciding what kind of private data you want to share with the network and you will be paid for doing so. You can monetize your personal preferences.

## 2 | WHY NOW?

These technologies can be implemented today because we have the following ingredients:

1. Decentralized file systems such as IPFS[1] that allow a fast sharing of information in a peer to peer way. A main result of this technology is the possibility of having a decentralized key-value storage that can be accessed and updated by anyone.
2. Incentivized Databases such as Ethereum blockchain allows us to have a notion of time and of immutable records if we pay the price the network need[2, 3].
3. The same blockchain can be used to implement Smart Contracts using extra basic cryptography by users to lock value. This value can incentivize data contributors and end consumers that will unlock and receive the value[4, 5].
4. Also, previous collaborative data technologies like Semantic Web[6] and Folksonomies[7] can provide a huge experience and techniques for categorization of data. For example, DBpedia is a crowd-sourced community effort to extract structured information from Wikipedia, a very useful data schema for any new open data project[6].

## 3 | WHAT ARE THE INGREDIENTS?

To comprehend the nature of Meseus you need to understand its ingredients. Each element of the design is combined with the other to generate a new decentralized market of attention:

- Item-based Decentralized Recommender System.
- Continuous Token-Curated Registries.
- Secure Multi-party Computation.
- Decentralized Exchange using Smart Contracts.

First you need to know what a *Item-based Recommender System* based on *Locality-sensitive Hashing* (LSH) is. These kind of systems implement a technique for estimating how similar two sets are. In the case of recommender systems, you have pairs made of user and items favored by the user. Each user is represented by a set of favorite items. Using the system, if you provide an user, you can recall similar users. After that, you can recommend new items to the user based on the items consumed by similar users[8].

The technology for *Continuous Token-Curated Registries* is very recent[?] but during 2018 gained a lot of interest. Although the main application is for rating items, you can use these token to generate an *artificial scarcity* of token associated to some information, in our case items, so is not free for each user to construct its set of favorite preferences[9].

The broad academic branch of cryptography called *Secure Multi-party Computation* (SMPC) allows for the private computation of algorithms on a distributed network of computers. All the parties in the networks need to jointly compute a function, but some of the parties may not be friendly and can try to disrupt the distributed protocol devised to complete the computation. This problem has also been solved, on a general setting, by Smart Contracts implemented on Blockchains, but usually we speak of SMPC in the context of lightweight specialized algorithms designed for particular mathematical functions or numerical computations. In our case, we need SMPC applied to Data-Mining algorithms[10].

This is not innovative in 2018, but we need a *Decentralized Exchange using Smart Contracts* to having consumers asking prices for their attention and campaign creators bidding prices.

## 4 | WHAT ARE THE MAIN ADVANTAGES?

The main advantages of the Meseus technology are displayed on the following table. Brave Browser and Basic Attention Token[11, 12], excellent projects, share similar goals with Meseus in relation to privacy and user rewards, but are not sophisticated enough on Micro-segmentation, Consumer Bidding, Tokenized Preferences and Proofs for Publishers:

	Google Ads	Facebook Ads	Brave Browser	Meseus Protocol
Ad Auctions	YES	YES	YES	YES
Consumer Rewards	NO	NO	YES	YES
Consumer Privacy	NO	NO	YES	YES
Micro-segmentation	YES	YES	NO	YES
User Bidding	NO	NO	NO	YES
Tokenized Preferences	NO	NO	NO	YES
Proofs for Publishers	NO	NO	NO	YES

## 5 | CONCLUSION

Meseus is an excellent project that will benefit publishers, consumers and will allow personal preferences to be tokenized and priced! Meseus allows for each consumer and each publisher to place them selves on the economic spectrum they are comfortable to receive the content and advertising they are willing to pay for, and gives the entrepreneur-minded the opportunity to measure and raise its exposure on the Internet of Attention!

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