

# A Decentralized Wealth Management Platform

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## Abstract

The platform contains a stack of protocols that facilitate the formation of trustless wealth management services for the users dealing with on-blockchain digital assets. The platform is intended to serve as a permissionless environment for programming, execution and marketing of individual investment management services whether they are performed via the traditional human-driven model or via robo-advisory. All sensitive processes, data and assets are controlled by a system of four networks and blockchain smart contracts that are publicly accessible. Index data storage network is used to store large data sets. Thus, data delivery, computations, reconciliation of portfolio, assets exchange, settlements and service efficiency measurement do not require a trusted third party. Platform's microservices are mainly free of charge except network fees and security deposits required to incentivize operations, correctness and fairness. The architecture of the platform allows to measure individual investment management efficiency transparently. The platform's front-end is intended to provide wealth managers with performance-dependent marketing tools that will allow managers to save branding costs and will motivate the managers to increase portfolio management efficiency. For the first time will the investors see proven effectiveness and reliability of wealth management services.

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# 1. Glossary

**Advisory investment service** is a form of investment management services that assumes individuals to approve transactions proposed by the investment managers before making changes to their portfolios.

**Asset management** is a professional service of managing an individual or a collective investment portfolio. Figure 1 allows to compare a set of services related to asset management and to wealth management.

**Assets under management (AUM)** is the total market value of all of the financial assets which a financial institution manages on behalf of its clients and itself.

**Discretionary investment service** is a form of investment management services in which buying and selling decisions are made by an investment manager on the client's behalf.

**Investor** is any person or organization that commits capital with the expectation of financial returns.

**Net asset value (NAV)** is the value of a client's assets minus the value of liabilities.

**Robo-advisory** is an automated, algorithm-driven wealth management service with little to no human supervision. At the start of the process a robo-advisor typically collects information about client's goals, risk appetite and financial aspirations via an online survey. Then, the robo-advisor engages in an ongoing process of rebalancing the investment portfolio based on the market data to keep it inline with the client's goals.

**Trustless** refers to the process not requiring a trusted party. Since the rules in the interaction between the process participants align with the Nash equilibrium, a collective decision becomes the outcome of the process, as required by principal.

**Wealth** is a measure of the value of all assets of worth owned individually or collectively that can satisfy needs.

**Wealth management** is a professional service for individuals that combines financial planning, investment management, accounting, tax and legal services, advice on services in the areas of education, healthcare, philanthropy, lifestyle, etc. Types of wealth management services vary depending on the forms of the individual investment management process (see Figure 2 and Table 1).

**Wealth manager** is an individual or organization who intends to provide wealth management service personally or through a portfolio rebalancing algorithm.

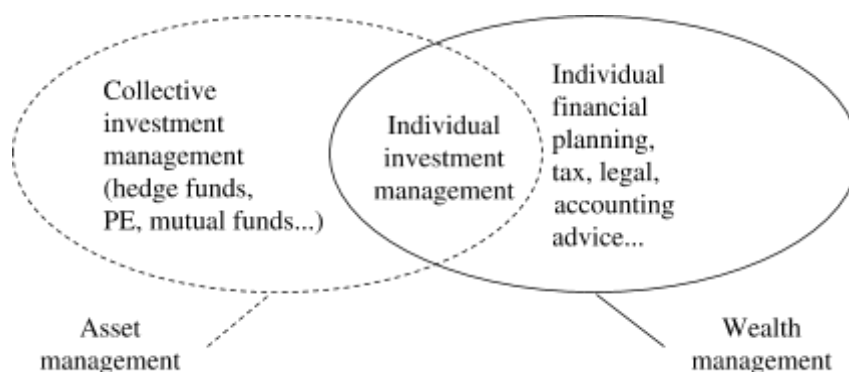


Figure 1. Sets of services related to asset management and to wealth management.

Ovals with dashed and solid lines represent a set of services related to asset management and wealth management, respectively.

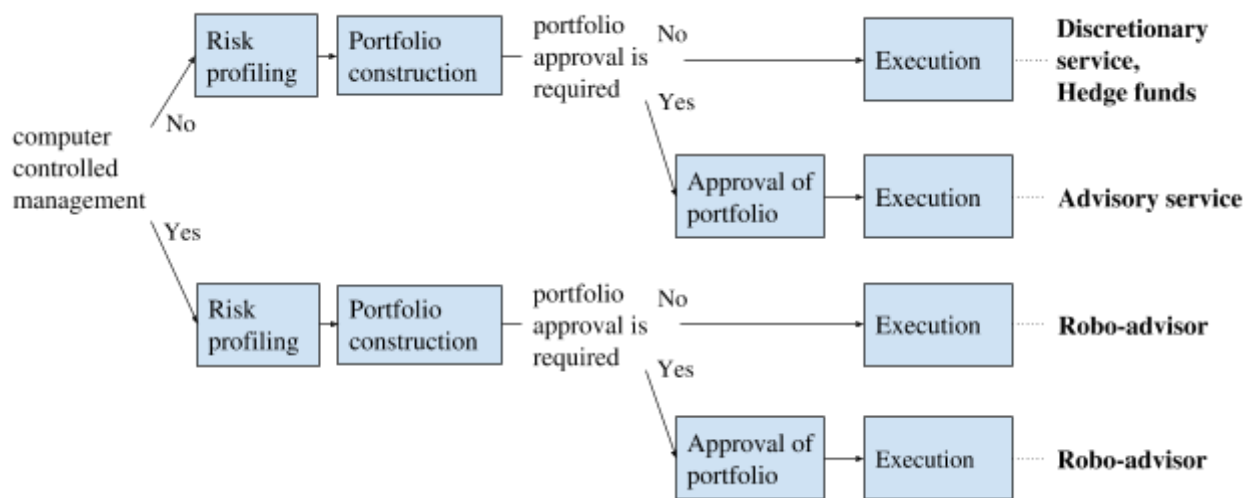


Figure 2. Iteration of threads in the consolidated investment management processes, and their names. Rectangles and regular text represent investment subprocess and the scenarios of the process execution, respectively. Arrows between the rectangles represent the information flow. Titles of the process threads are marked in bold. The description of the reporting process is omitted intentionally, since it does not affect the identification of the service executors. The detailed process is, as follows:

- Risk profiling<sup>1</sup>: Comprehensive analysis of the needs and objectives of the client;
- Portfolio construction: Determining the structure of the investment portfolio so that it matches client’s investment objectives and his risk profile;
- Approval: Approval of the investment portfolio with the investor, and adjustments as needed;
- Execution: Exchange of assets to structure the desired portfolio;
- Reporting.

Table 1. Types of wealth management services.

	<b>Approval of an investment portfolio with the investor required</b>	<b>Approval of an investment portfolio without the investor</b>
<b>Human-driven</b>	Advisory service	Discretionary service
<b>Computer-controlled</b>	Robo-advisor	Robo-advisor

<sup>1</sup> One part of the content of the risk profiling test is controlled by the special legal requirements, like MiFID and others. The other part is arbitrarily determined by the manager in relation to the range of services.

## 2. Introduction

There are three main values that affect the choice of a wealth manager: reliability, competence, and price. Over the past 100 years, innovation in the wealth management industry has been predominantly related to reducing management costs and prices. While competence and reliability of wealth management companies may have changed, they have always been hidden by the veil of a brand that the client could only trust.

### **Management costs**

Until the second half of the 20th century the traditional wealth management market had a limited number of high-net-worth clients, but by the end of the century mass-affluent investor class emerged. With the rise of the wealth management industry, however, the cost of services provided by the qualified specialists remained high, not meeting the mass-affluent clients' expectations. Simultaneously with growing computational power, two solutions have emerged to decrease the costs and serve more clients. The first solution is the so-called wealth management platforms<sup>2</sup> (later - "WM Platform"). They are essentially the enterprise resource planning (ERP) solutions that provide automation for end-to-end wealth management process, except sales. The WM Platform's developers intended to include portfolio management functionality to allow wealth managers to free up time and focus on generating sales. Although, as soon as such platforms have incorporated portfolio management function, they began to act not as platforms, but wealth management firms that hire third parties to sell their services. The second solution is "robo-advisors", which resemble the WM Platforms with online sales functionality. The robo-advisor was introduced in 2008<sup>3</sup> as a low-cost alternative<sup>4</sup> to human-driven wealth management services. By eliminating human input into the sales process, the robo-advisor managed to lower the cost by 0,5% of NAV. Most robo-advisors charge an annual fee of 0.0% to 0.89% (see Table 2) of NAV, while the average fees for human-driven wealth management services are in the range of 0,5-2% NAV, and 5-20% of the profit, depending on the portfolio size.

### **Lack of competence and reliability metrics**

Service provider's reliability in terms of financial sustainability can be measured by credit ratings, but the integrity remains a matter of trust. With regard to the competence in individual investment management, there are no generally accepted methods of measurement and comparison, see [§3.3](#). Since actual

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<sup>2</sup> As of March 2018, there are more than 30 wealth management platforms. The most known names are: 7IM, Aegon Arc, AJBell Investcentre, Alliance Advisors, Ascentric, Aviva, Cofunds, CredoWealth, Elevate, Embark, Hubwise, Novia, Nucleus, Standard Life Wrap, Succession, Transact, True potential wealth, Robustwealth, inStream, Macroaxis, iBalance, Dorsum, Fnz, Finserv.

<sup>3</sup> The first robo-advisor was developed in 2008 in the US, and quickly expanded into Europe, Australia and Canada. Since then, the number of robo-advisors and the amount of assets under management (AUM) have been growing rapidly. By the end of 2017, the quantity of available robo-advisor services numbered to 100, while AUM amounted to \$224 billion. Source: Statista.

<sup>4</sup> It is worth noting that, as of March 2018, except for lower fees on an average of 0.35%, robo-advisory has lower capital threshold requirements and better service accessibility. Robo-advisory has a standard requirement of \$5,000 worth of liquid assets that a user should have in order to use the service; it is also available 24/7 as long as the user has an Internet connection.

Previously and to a large extent today, the mechanism for low-cost asset management was and is performed by mutual funds, but its use also becomes increasingly popular in the operations with Exchange Traded Funds (ETFs). However, this form of management gives the same exposure to all investors. Since the investors have different investment goals and risk profiles, this uniform approach does not yield an appropriate risk/return ratio for each investor.

competency and reliability metrics are not being calculated, they cannot be delivered to the client and affect sales. In practice, sales from wealth management services are driven by the brand, which is expensive and detrimental to both investors and wealth managers.

Table 2. The largest robo-advisors operating in US.

Name	AUM, \$mln	Annual fee, % of AUM	Name	AUM, \$mln	Annual fee, % of AUM
Vanguard Personal Advisor Services	47000	0,3	Nutmeg	751	0,75
Schwab intelligent portfolio	10200	0	AssetBuilder	671	0,25-0,45
Betterment	7360	0,15-0,4	Wealthsimple	574	0,4
Wealthfront	5010	0,25	Financial Guard	454	\$149,95/ year
Personal Capital	3600	0,59-0,89	Rebalance IRA	403	0,5
Future Advisor	808	0,5	Scalable capital	222	0,75

Source: Statista, Accessed 2017-02.

However, it is known that all that objectively exists is subjectively measurable, even love. We believe that the consensus between investors regarding the methodology for measuring the effectiveness of individual investment management - along with a protocol allowing to immutably record goals and results - will lead to the emergence of a generally accepted efficiency metric.

Quantitatively comparable services will then encourage the growth of the demand distribution by the service quality and the lack of the service demand distribution by brand.

### **The emergence of on-blockchain assets management issue**

Blockchain is a distributed ledger of immutable chronological records that allows to store data and perform computations controlled by a decentralized consensus. Similarly to the regular assets register accounts, the data in blockchain can represent value. Blockchain allows to perform computations. Computations in blockchain are executed by the rules known as smart-contracts[Nick]. Under the control of the decentralized consensus, smart contracts allow the community to avoid the need in involving a trusted party in the processing of sensitive data, yet being sure that the processing rules will run exactly as they are written. This valuable feature has led some of the national and local governments to shift asset registers to blockchain [Georgia, Sweden, Illinois] and to legalize on-blockchain assets. At the same time, the establishment of companies in the form of Decentralised Autonomous Organizations (DAO), which are essentially smart-contracts emulating legal entities, has begun.

Step by step, these trends lead to the emergence of a tokenized form of each asset class. Since theft or malicious transactions with tokens cannot be reversed, there is an issue as to who should own assets in the process of investment management.

### **Trustless Wealth Management Technology Map**

We aim to reduce time-to-market and, therefore, intentionally seek to internalize mature technologies. In the left column of Table 3 outlined the required functionalities for building a trustless wealth management

service, and the right column suggests the possible solutions that have a basis for developing such functionality.


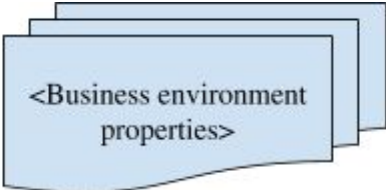
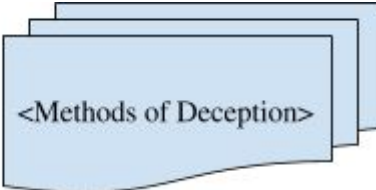
Table 3. Required functionalities for building trustless wealth management.

Required functionality	Approaches
1. Trustless choice of methodology of measurement to achieve client investment goals	<i>Preliminary tech:</i> Ethereum smart-contracts - production ready, RootStock, EOS - still not production ready.
2. Trustless way to avoid the conflict of interests	
3. Trustless marketplace of wealth management services	
4. Trustless assets storage	Decentralized blockchains: Ethereum, Bitshares, Stellar, EOS, NEO, etc.
5. Secure storage and delivery of large data series	IPFS - production ready, Quandl, Benzinga - production ready, not secure Sia., StorJ, Filecoin, MaidSafe, Cryptyk - still not production ready
6. Trustless and cheap computing with data privacy protection	Enigma MPC, Golem, SONM, Iexec, GridCoin - still not production ready
7. Trustless exchange of assets managed by smart contracts	Bitshares, Etherdelta, IDEX, Bisq, Stellar - production ready, Ox, Loopring - still not production ready
8. Trustless financial data marketplace	Enigma, DDam, IOTA Data Market - still not production ready, Quandl, Benzinga - production ready, but need trust

### 3. Challenge

The modern wealth management industry suggests that customers must trust the competence and the integrity of the asset manager, broker, depository, registrar and the ability of the judiciary to protect assets. However, customer confidence is often abused by investment managers, brokers, and depositories. Customers may face unfair treatment with regard to their interests, such as asset seizure, theft, sale of the overvalued assets from one’s own portfolio, etc. Table 4 presents the reasons and opportunities inherent to the business environment that encourage and enable investment managers to mistreat their customers.

**Table 4. Reasons, environment properties and methods that motivate and allow the manager to act against the client's interests.**

		
<ul style="list-style-type: none"> <li>- Financial distress;</li> <li>- Lust for money;</li> <li>- Negative impact of the human factor;</li> <li>- Reward from the issuer of an investment product for choosing it over a better one;</li> <li>- Politically motivated order for blocking and for a confiscation of assets;</li> <li>...</li> </ul>	<ul style="list-style-type: none"> <li>- Lack of regulator requirements for the disclosure of the effectiveness of individual investment management;</li> <li>- Right to exchange assets on behalf of the client;</li> <li>- Inefficiency of judiciary in the recovery of stolen crypto assets;</li> <li>- Subordination to the judicial and executive authorities;</li> <li>...</li> </ul>	<ul style="list-style-type: none"> <li>- Restriction of access to all investment opportunities;</li> <li>- Theft of assets;</li> <li>- Sale of the overvalued assets from one’s own portfolio or for reward from the asset issuer;</li> <li>- Provision of false data that can influence investor's decisions;</li> <li>- Freezing or confiscation of assets by the order of the authorities;</li> <li>...</li> </ul>

Going forward, we believe that the causes of unfair treatment cannot be changed. We argue it is worth to focus on creating counterweights to those reasons and changing the investment management environment so that the fair treatment is the best strategy.

In our opinion, the cases of poor asset management or theft of assets are so frequent that they do not require proof. Below we present our findings in the form of the reasons and business environment properties that cause malicious behavior in investment management.

#### 3.1. Reasons

##### **Negative Impact of the Human Factor.**



The studies [HF] of negative impact of the human factor in management process identify the following types:

- skills-based errors,
- decision errors,
- errors of perception,
- conscious violations.

These factors have a potential to cause harm to the client, and are unavoidable whenever a human is involved in the wealth management process. Although investment process is largely algorithmic, the algorithm creation process is managed by a human.

### **Greed and Distress of Wealth Managers.**

Financially distressed or greedy [Greg] wealth management company has an incentive to get unfair income by performing malicious actions presented in Table 4, s. Methods of Deception. So far, market regulators [FSA] have sought to deter asset managers from malicious activities, subjecting them to certain requirements, limitations and guidelines. However, findings [GW, FSA] show that conflicts of interest still occur.

Financial distress often follows the regulatory pressure, failed management of one’s own assets, dependence on a distressed affiliated party. See the level of affiliation in the wealth management market in Table 5 below.

**Table 5. Distribution of AUM among affiliated and independent wealth management service providers, %.**

Country	Affiliated wealth management service	Individual financial advisors
United Kingdom	80%	20%
Switzerland	87%	13%
United States	95%	5%

*Source: The Boston Consulting Group, 2018*

## 3.2. Business environment properties

### **Inability of the judiciary to recover on-blockchain assets.**

Blockchain security methods use public key cryptography. It means that a key pair is being used: one key that is public and one that is private and only known to the owner. Only private key holders may have access to assets registered on blockchain. The public key is designed to verify that it is its holder of the private key who sent an asset.

Therefore, the investor has two options for purchasing an investment portfolio when working with a financial advisor:

1. Execute transactions himself.

The option tends to be laborious for the investor. More importantly, it creates an opportunity for the investor to violate the agreement to pay remuneration to the wealth manager, since the latter does not have access to the investor's assets.

2. Hand over the private key to the manager or to the third party responsible for the execution. The option appears inefficient in the context of the modern judicial system. Bailiffs cannot modify records in the blockchain registry, so they cannot protect investors against theft or malicious transactions.

### **Inability of the judiciary to confront politically motivated blocking and the confiscation of assets.**

In order to satisfy the regulator's requirements, a wealth management company or a depository can suspend its service for the client and block/confiscate assets. The cases of such an unfair behaviours occur because the assets registers are operated by a designated party which is under the power of the executive and judicial authorities.

### **Lack of efficiency metrics for individual investment management**

Using the management efficiency metric we understand the extent to which management goals are achieved. Wealth managers have the power to harm the client, which reduces management efficiency. Therefore, the openness of the management efficiency metric allows clients to compare different managers and, thus, use the competition mechanism to encourage the managers to abandon malicious activities.

So far, market regulators have not established any methodologies for assessing the conformity of the results with the pre-established management objectives and have not established any information disclosure requirements to carry out such assessments. In an attempt to fill this gap, GIPS standards[G] has set the rules for disclosing information, although they are focused on measuring the performance of arbitrarily aggregated portfolios which do not allow for wealth managers' comparability and do not take into account the specificity of financial goals. They are, therefore, useless in choosing an effective manager. Fitch IMQ ratings [IMOR], Moody's MQ ratings and other less-known providers are only focused on appreciating of collective investment management firms.

That is why wealth management companies seek to convince clients of their competence and reliability<sup>5</sup>, not to be so in reality.

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<sup>5</sup> To prove their competence and reliability to the clients, wealth managers disclose parameters that do not really mean anything:

- Period of time they exist;
- Credibility of the managers;
- Volume of assets under management;
- Rich website and office;
- Investment methodology, and so on.

## 4. Wealthman Solution

The goal of Wealthman is to create next generation platform for building advisory, discretionary and robo-advisory services for digital assets, containing the useful set of anti-fraud and marketing features. We are placing particular emphasis on situations where there is no trust of investor in wealth manager's competency and honesty, centralized infrastructure security, and where low costs and speed of high-tech wealth management service deployment are important.

Wealthman does this by building protocol and a decentralized infrastructure on blockchain (L1) and [off-chain] (L2) layers that provide efficient distributed applications execution. Wealthman platform is designed to allow any user to start advisory service or easily develop a decentralized robo-advisory or more complex dapp. Such services can be configured with arbitrary rules for calculating the structure of the investment portfolio on the basis of a constantly updated and insured data set, transaction execution rules and remuneration terms.

The program similar to the Betterment service can be developed and deployed pretty quickly, and a simple advisory service could be launched in minutes. Discretionary service can also be built on the platform, with a much higher safety than the one secured with legal paper document as it benefits from the added safety of a smart-contracts and secure protocols. Although this type of service can not be classified as safe, the investor's distributed application allows you to mitigate the risk by limiting the set of crypto assets, from which the manager can form an investment portfolio and set other limits or permissions.

Several valuable features of the platform:

Feature	Functions	Value
Obligatory approval of the investment portfolio or algorithm code change with the investor	Protection of the investor from deceit by the asset manager	Asset security
Opportunity of investor to limit the set of assets from which the investment portfolio is formed	Protection of the investor from deceit by the asset manager	Asset security
Execution of transactions by a decentralized broker program, which retains access to assets only to the investor	Protection of the investor from deceit by the asset manager	Asset security
Inaccessibility of the code of the robo-advisor algorithm to the investor and third parties	Protection of intellectual property of asset manager	Intellectual property security
Result-dependent ranking of wealth managers and robo-advisors	Understanding who will better help achieve financial goals.	Quality of management
	Allows a quality manager to	Cost Savings

	save on the costs of marketing.	
Environment for easy development and execution of advanced robo-advisors	Low costs for programming of robo-advisors	Cost Savings
Data supply secured by collateral through a frozen smart contract system	Coverage against risk of disruption of the continuity and correctness of the data supplied to asset managers	Assets security
Decentralized calculation, storage, transactions execution, and data provision	Elimination of capital risks caused by centralization	Assets security

#### 4.1. Long term vision

Wealth management of the future is a sophisticated high competitive professional activity with demand to trustless distributed solutions, protocols and platforms. Wealthman in long-term is a trustless distributed protocol and platform for best wealth management practices and applications that guarantees transparent trustless on-chain and off-chain transactions for all participants with privacy protection.

Core platform functionality is implemented as a set of dapps backed by smart-contracts, distributed database plus provided by decentralized oracles external data-sources, additional computing resources and other off-chain interactions accessible from secure web applications.

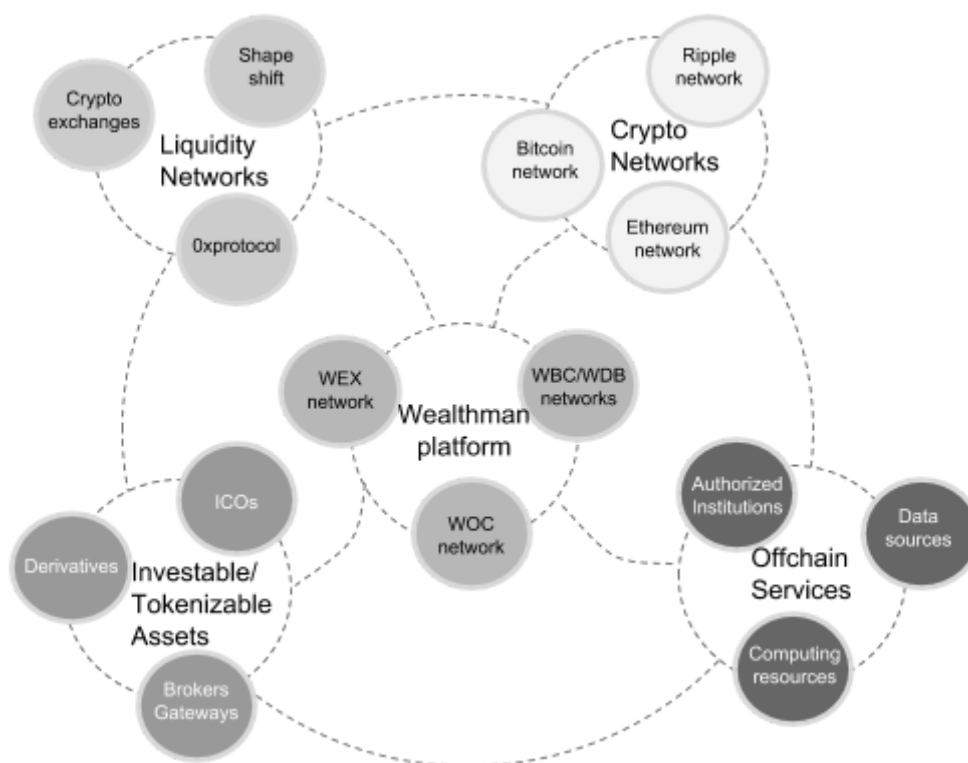
Important goal of Wealthman protocol is to keep and protect privacy in trustless environment. Blockchain technology has a privacy issue, all transactions are visible and analyzable for everyone. There is a several approaches to overcome the privacy issue, which are considered to use, they are zero knowledge proofs, ring signatures, homogeneous encryption, and finally off-chain transactions over channels networks.

#### 4.2. Wealthman architecture

Wealthman platform has been being built on intersection of three concepts:

- smart contracts and distributed ledgers extended by distributed databases
- high performance, IP protected computing adopted to trustless distributed environment
- secure crypto protocols for distributed platform participants

Core platform applications are Wealthman platform distributed application (WPA), Wealthman distributed exchange (WEX), Wealth management distributed application (WMA), Wealth investment distributed application (WIA), data/computing marketplace and off-chain services (Providers).



DApps are built on Wealthman blockchain network (WBC), Wealthman distributed database (WDB) and second dedicated blockchain exchange network (WEX) for best performance and scalability. Wealthman main blockchain network is a permissioned blockchain with turing complete smart-contracts. Distributed custom design database is for large datasets with data linked (hashed) on main blockchain. Wealthman blockchain exchange network is a permissioned blockchain as well natively bridged to main network. Wealthman decentralized off-chain (WOC) network is very important part integrated with core platform components and external data sources/computing resources and authorized institutions (off-chain services). Core integrations are to crypto networks (Bitcoin, Ethereum, Ripple,...), liquidity networks (OxProtocol, Shape shift, other exchanges), Investable/Tokenizable assets (ICO, derivatives, Brokers gateways, etc.)

First generation Wealthman multichain architecture will be implemented as public permissioned blockchain (WBC) bridged to Ethereum mainnet and to other valuable networks with architecture patterns presented in [Plasma]. Why not to implement everything right on Ethereum mainnet for instance, 'cause of scalability problem, high fees, low throughput and technology lock in. Digital assets processed on different networks can be tokenized on Wealthman exchange (WEX) for quick low fee exchanges and transfers. For example frequent BTC trading is impossible on bitcoin main network, but if tokenized on Wealthman platform no problem to do that. Any kind of assets can be tokenized on Wealthman platform even not digitized before.

Wealthman distributed database (WDB) with extended indexes is an essential component for dapps that operate with data series, paired with blockchain (WBC) for data integrity.

External data provider(s) is needed to perform portfolio computations. Nodes in Wealthman off-chain network (WOC) are external off-chain actors who can get data and call contract or watch events and get control/meta data back to contract and data to database. But if to use single external provider it would be a centralized point, or single point of failure, to prevent this Wealthman protocol handles WOC nodes as a decentralized construction.

Off-chain secure protocols (layer two or L2) are designed to solve both problems security and scalability, Wealthman L2 protocol solves the same but specifically for wealth management, investor can open private channels to selected managers and construct interactions within these channels. Typical L2 protocol patterns

include such steps as deposit values, off-chain managed actions, withdraw values or continuation/reinitialization of investment loop.

Best investment results are based on data, good models/simulations, intuition and finally a bit of luck. For better simulation results (forecasts) we need two things computing power and big data.

It's a good challenge to adopt HPC technologies in decentralized environment. For better performance computing resources should be concentrated in one location as a small or big cluster and a special hardware (GPU,TPU,..) should be used. Such cluster can be a unit in trustless distributed computing network. To protect algorithmic IPs the whole task can be split to many protected computing parts as well as data partitioned and obfuscated. It prevents for hackers to reconstruct computing algorithms. Moreover [moving\_target\_defence] can be applied for false computing and data as well to increase protection level. Very well known [mapreduce] pattern is a best choice to organize computing in trustless distributed environment with requirements to protect algorithms and data. Final results reduction is processed privately off-chain, no chances to disassemble distributed partitioned algorithms.

Progressive wealth managers can spent big budgets for data and simulations to be competitive.

The whole niche of blockchain era is new data markets where data and data streams are tokenized for sale. Data protection becomes more important and widespread, an example General Data Protection Regulation [GDPR]. Persons or organizations will sell their data on data markets that's a trend. Hidden personal data collection and analysis will be prohibited.

Dapps development and debugging on Wealthman distributed multichain infrastructure is a big part of future ecosystem evolution. Each blockchain network has two networks mainnet and testnet. Dapp design begins with distributed protocol which defines the program of actions for every participant, then it's implemented as a software bundle of smart-contract code, oracle code, client-side code and user interface interactions (UI), tests and docs. Think different than traditional enterprise software development, that's secure protocol oriented programming.

Security is most important, security hole or bug may costs billions. The golden rule of protocol code design, especially smart-contracts is to keep it simple, well testable, 100% tests coverage is a must. Smart-contracts code review is a good business.

### 4.3. Wealthman roles

Wealthman platform main roles (entities with private keys, rights and value):

**Manager** - individual or organization who provides investment management services personally or fully/semi automated by distributed software on platform.

**Investor** - person or organization interested to transfer non exclusive ownership to managers or management software on platform for a period of time for income.

**Provider** - person, organization represented as node(s), who provides off-chain data/computing, external computing resources, integration to other networks.

**Broker** - person, organization who provides external assets usage and tokenization manually or programmatically (represented as node(s)).

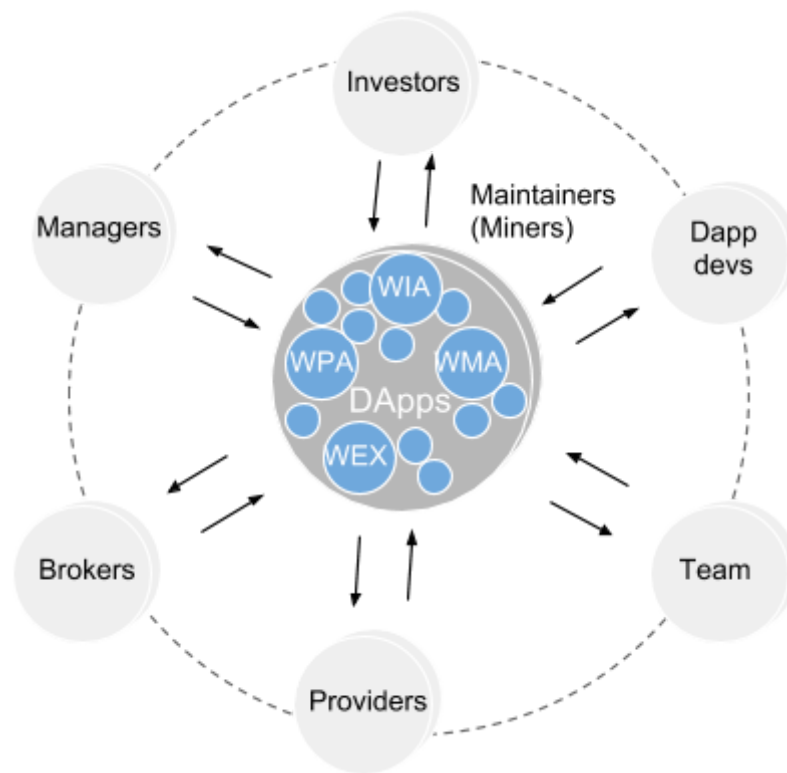
**Miner (Maintainer)** - person, organization represented as blockchain/distributed\_db node(s), with aim to earn on "mining" and network support.

**Team** - Wealthman protocol and platform creators and developers.

**Dapp developer** - person or organization who develops distributed applications (dapps) on Wealthman distributed infrastructure.

**Guest** - unknown person who is interested to look around.

Every Wealthman member according to role follows roles protocol to interact with platform and other players on-chain and off-chain, this functionality is implemented in Wealthman DApps.



Every DApp implements some protocol of interactions between infrastructure components, participants, external networks, etc. Some DApps functions require (defined in protocols) users to sign transactions. It's recommended to use isolated hardware wallets for secure private key usage. Don't share your private key, keep it secret.

Wealthman platform participants can be viewed as three groups: users, developers and maintainers. Developers (Team, Dapps devs) design protocols, build infrastructure and implement dapps. Maintainers (Mainers) deploy and maintain networks nodes. Users (Investors, Managers, Providers, Brokers) just use this cool stuff to make money. Guests don't need a private key to explore resources and data anonymously, that's ok.

#### 4.4. WPA

The main purpose of Wealthman platform DApps (WPA) is to provide core part implementation of wealthman protocol, on-chain (contracts/ddb) and off-chain (Oracles/Hubs). It includes many aspects:

- Public accounts (personal and business information) registration, update, verification
- Extended profiles
- Investors, managers, providers lists
- Multisig shared deposits
- Proofs of some data, events and offline facts

Wealthman platform contracts and database indexes are used by platform dapps and can be used by 3d party developers for new applications.

Traditionally users represented on blockchain networks as an address (derived from public key), that's good because any name service is additional security issue. But in terms of KYC, AML accounts with extended personal and business information required, to satisfy this we can control access to information and open it by demand, but keep it encrypted on public distributed database. Zero knowledge schemes can be used as well, for not to open all information but prove some necessary facts.

#### 4.5. WIA

Wealth investment DApp (WIA) are designed for investors to search and interact with managers, robo-advisors, management dapps, deposit and withdraw funds, monitor investments or do some investments directly . WIA gives basic functionality to setup investment settings, preferable digital assets, strategies and so on. This is second very high level management. But all hard work is done by Managers or management software without not permissioned access to funds and possibility to do something out of settings.

## 4.6. WMA

Wealth management DApp (WMA) are designed for managers to manage, monitor, update management portfolio manually, semi/fully automated. Managers promote themselves or their robo-advisory dapps to get more funds from Investors. WMA provides integration to WPA for extended profiles. Managers can trade manually on internal exchange (WEX) or external exchanges. For trading automation it's possible to use simple build-in scripting tools with limited functionality or hire Dapp developers for more complex development. It's possible to build and deploy fully functional extended Dapp and publish it on Wealthman Dapp portal.

## 4.7. WEX

Internal distributed exchange Wealthman DEX (WEX) allows players to buy/sell assets with minimal fee and latency, off-chain OTC transactions are supported as well.

Wealthman DEX is a hybrid exchange operates on blockchain and off-chain layers. There are a lot of exchanges on the market, centralized ones are not good choice 'cause of single point of failure/power, the problem with DEXes is scalability problem, but DEX on dedicated blockchain with channels implementation is a solution. Access to DEX infrastructure and functionality are supported from WMA and specially designed WEX DApp, 3d party WEX DApps can be build. Anyone can trade on WEX, all you need is funds. There are a few possibilities to get funded, 1st one is to be funded by Investors, second - to be a Maintainer (Miner) and get rewards for infrastructure nodes run, 3d - to be a Provider/Broker and sale data or other stuff or services on internal marketplace.

## 4.8. Providers

Providers connect Wealthman platform to outside world. It's decentralized to prevent single point of trust, many providers organized in a network with possibility to mitigate risks of failure or malicious action. First kind of providers is external data providers with necessary functionality to push data from external data sources to smart-contracts / distributed database and vice versa. Second is computing resources providers or off-chain protocols support computing decentralized providers.

## 4.9. Dapps portal and data/computing marketplace

The competition between wealth managers is digitized on DApps portal where investors can find and do business with Managers represented on platform for manual, semi or fully automated work. Managers can hire developers for new strategies, simulations or any other functions implementations. Providers may sell data, computing, off-chain services to Managers and Dapp developers manually or fully automated on Platform.

## 4.10. Infrastructure explorer

Blockchains, distributed database and other infrastructure components explorer (IE) is developed to search, view and verify transactions and data in raw format. IE is mostly for software developers, but can be used by ordinary users as well to check transaction status, search some data, look at stats and so on.



## 4.11 Wealthman high level protocols

### 4.11.1 Account setup protocol (WPA):

- 1) Generate random private key, encrypt (password), save to file
- 2) Setup base profile (KYC), save data to Wealthman platform contract/db
- 3) Proof some profile facts (use proof protocols)

### 4.11.2 Proof protocols list (WPA):

- 1) Proof of social network account ownership (linkedin, facebook, twitter, github,..)
- 2) Proof of mobile phone number
- 3) Proof of bank account
- 4) Proof of physical address

### 4.11.3 Investor On-chain investment protocol (WIA)

- 1) Tokenize assets on Wealthman platform
- 2) Deposit value (Tokens) to value management contract (VMC) with investment settings
- 3) Search for Manager(s)/DApp(s) to work with
- 4) Allow access to VMC value for Manager(s)/DApps with additional settings
- 5) Monitor how Manager(s)/DApps sell(s)/buy(s) assets limited by settings
- 6) Repeat investment and/or withdraw value (Tokens) from VMC limited by settings
- 7) Un-tokenize assets from Wealthman platform

### 4.11.4 Investor Off-chain investment protocol (WIA)

- 1) Search for Manager(s)/DApp(s) to work with
- 2) Open channel(s) to Manager(s)/DApp(s) with investment settings
- 3) Monitor how Manager(s)/DApp(s) sell(s)/buy(s) assets limited by settings
- 4) Repeat investment or close channel(s), withdraw value (Tokens) from channel(s) limited by settings

### 4.11.5 Manager On-chain investment protocol (WMA):

- 1) Setup extended manager profile, save data to Wealthman platform contract/db (WPA)
- 2) Publish profile info to available managers index (WDB)
- 3) Deploy management DApp(s) to Wealthmap platform (DApp Portal)
- 4) Promote management services (Managers list, DApps portal)
- 5) Monitor and accept investment offers, get funds under management (VMC)
- 6) Buy/sell assets limited by Investor(s) settings (investment loop)
- 7) Withdraw rewards defined by settings
- 8) Repeat management

### 4.11.6 Manager Off-chain investment protocol (WMA):

- 1-4) 4.11.5
- 5) Monitor and accept investment offers, get funds under management, open channel(s) to Investor(s), with management settings
- 6) Buy/sell assets limited by Investor(s) settings (investment loop)
- 7) Withdraw rewards defined by settings
- 8) Repeat investment loop and/or close channel(s)

### 4.11.7 Provider (Portal/Marketplace):

- 1) Setup extended provider profile, save data to Wealthman platform contract (WPA)
- 2) Publish profile info to available providers index (WDB)
- 3) Promote data/computing services (marketplace)
- 4) Monitor and accept contract offers (Marketplace contract MPC)
- 5) Provide data/computing services defined by contract(s)

6) Withdraw rewards

4.11.8 DApps developer (Portal/Marketplace):

- 1) Setup extended provider profile, save data to Wealthman platform contract (WPA)
- 2) Publish profile info to available DApps developers index (WDB)
- 3) Promote DApps development services (marketplace)
- 4) Monitor and accept contract offers (Marketplace contract MPC)
- 5) Provide DApps development services defined by contract(s)
- 6) Withdraw rewards

## 5. Wealthman Tokens

### 5.1. AWM token functionality

Wealthman platform native token (AWM) is a ERC20 compatible token represented on multichain bridged space, natively on WBC/WEX, as a contract on Ethereum main network, on any other ERC20 compatible networks. AWM owners can transfer tokens between networks upon their needs.

AWM is a native Wealthman platform token and is used as

- fees to Wealthman DAO for such platform microservices as reporting, contract creation and other system payments;
- stake to validate the conditions of data provision. The AWM token stake is held frozen in smart contract and covers against the risk of disruption of the continuity and correctness of the data supplied to asset managers;
- payment fuel or gas for transactions performed on Wealthman's platform;
- voting stake.

All Wealthman platform users must have some amount of AWM tokens to make a transactions on platform.

### 5.2. AWM token valuation

AWM tokens market price will fluctuate based upon the value that of network and platform required to operate the transactions. The value can be estimated by the formula for estimating net working capital:

$$1 \text{ AWM token price} \rightarrow \sum_{i=1}^n CF_i / ((365/DAYS_i) * N),$$

where  $CF_i$  - cash flow from i-th service, measured in chosen currency, e.g. bitcoin or ether;

$DAYS_i$  - number of days that the token should be in the hands of buyers and sellers of the i-th service, in order for the service to work properly (the norm of the stock of tokens in days);

$n$  - number of Wealthman platform services;

$N$  - number of estimated utility tokens in circulation.

The impact of the Wealthman platform participants on each component of the value of the token to increase its market price:

- Tokens used as collateral for uninterrupted delivery and correctness of data, are frozen by the contract for a period of  $t + 60 \text{ days}$ , where  $t$  is the length of service provision in days while 60 is the minimum number set for a freezing period;
- Average time of storage of tokens in Wealthman DAO of about 15 days;
- Wealthman DAO monthly burn AWM tokens 61,6858% of algorithmically calculated profit.

By default, Wealthman earn 20% of all Wealth Manager's service fees received from Investors (can later be changed by Tokenholders vote) and 20% of all Data provider service fees received from Wealth Managers.

Classic wealth management market average fees:

- 2% from Net Assets under management annually;

- 20% from Investor's net profit annually.

Robo-advisor market average fees:

- 0,2% from Net Assets under management annually.

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