A Decentralized Wealth Management Platform

_____

Maya Epshtein, Dimitrio Khan, Andrei Huseu

wealthman.io

May, 2018

Abstract

The platform contains a stack of protocols facilitating users to build trustless wealth management services dealing with on-blockchain digital assets. The platform is intended to serve as an permissionless environment for programming, execution and marketing of individual investment management service whether it performs via the traditional human driven model or robo-advisory. All sensitive processes, data and assets are controlled by a system of Ethereum smart contracts that are publicly accessible. IPFS fork is used to store large data sets. The data acquisition, off-chain computations, reconciliation of portfolio, assets exchange, settlements and service efficiency measurement do not require trusted third party. Platform's microservices are mainly free except network fees and security deposits required to incentivize operations, correctness and fairness. The design of the platform involves transparent measure of individual investment management efficiency. We believe that marketing benefits receiving by more effective managers will save for them branding costs and motivate to increase quality. For the first time investors will see proven effectiveness of wealth management service, and be able to avoid the conflict of interests.

Table of contents

1. Glossary

Advisory investment service is a form of investment management service in which private individuals approve transactions proposed by investment manager before making changes to their portfolios.

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

AUM is the total market value of all the financial assets which a financial institution manages on behalf of its clients and itself.

Discretionary investment service is a form of investment management service in which buy and sell decisions are made by an investment manager for the client's account.

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

NAV, Net assets value is the value of a client's assets minus the value of its 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 a client's goals, risk appetite and financial situations via an online survey. Then the robo-advisor engages in an ongoing process of rebalancing the investment portfolio based on market data to keep it inline with the client's goals.

Trustless refers to the process not requiring a trusted party because the rules of interaction of process participants constitute a Nash equilibrium, which leads to a collective choice of the outcome of the process, which is needed by principal.

Wealth is value 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 sphere of education, lifestyle and relationships. Types of wealth management services vary depending on 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.
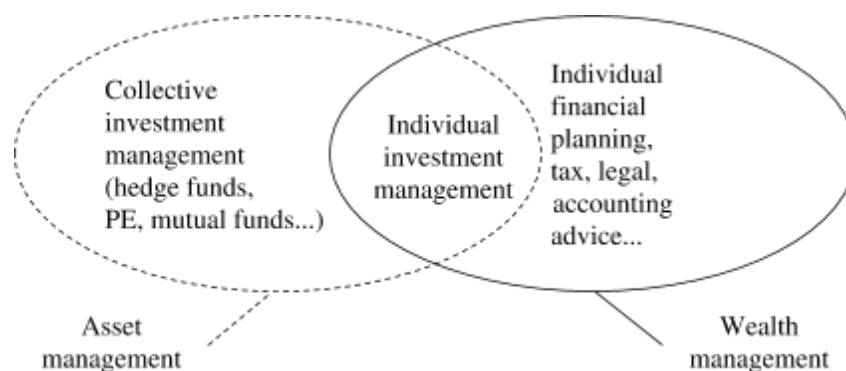

Figure 1. Sets of services related to asset management and wealth management
Oval with dashed line and solid line represents a set of services related to asset management and wealth management, respectively.
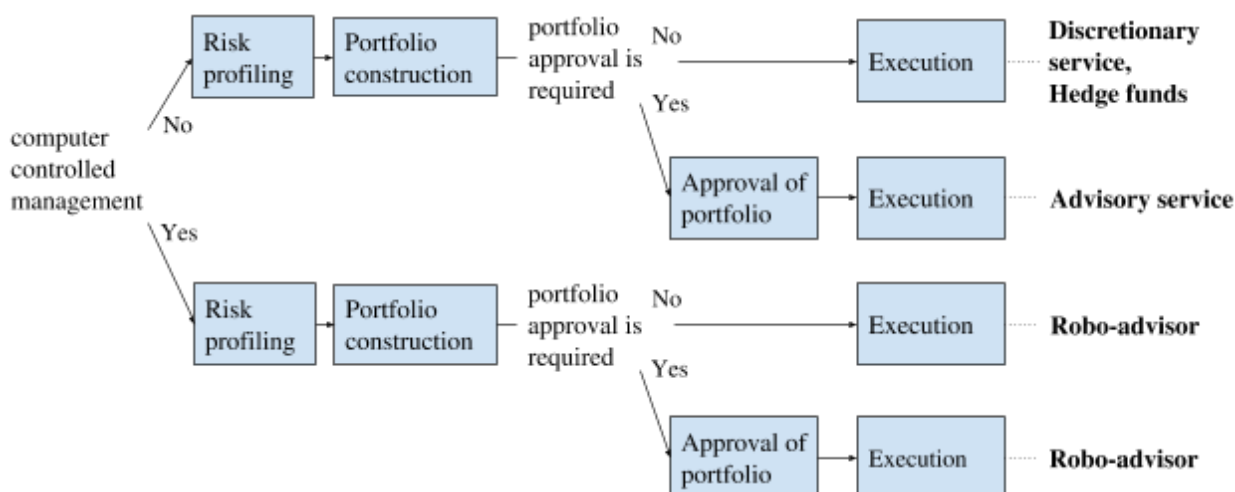
Figure 2. Iteration section of consolidated investment management processes threads, and their names. Rectangles and regular text represent investment subprocess and condition of how following process is executed, respectively. Arrows between rectangles represent information flow. Bold text represents names of the process threads. Reporting process is intentionally missed, since it does not affect the identification of the name. The detailed process description:

- Risk profiling[1]: 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 risk profile;
- Approval: Approval of the investment portfolio with the investor, and adjustment as needed;
- Execution: Exchange of assets to bring to the desired portfolio structure;
- Reporting.

Table 1. Types of wealth management services.

	Approval of an investment portfolio with an investor is required	Approval of the investment portfolio with the investor is skipped
Human-driven	Advisory service	Discretionary service
Computer-controlled	Robo-advisor	Robo-advisor

[1] One part of the content of the risk profiling test is under control of special legal requirement like MiFID and others. The other part is arbitrarily determined by the manager in relation to the range of services.

4

2. Introduction

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 had emerged. There was a dawn of wealth management industry, however the cost of qualified specialists did not match the mass-affluent client's desires. Simultaneously with growing computational power, two solutions have emerged to decrease costs and serve more clients. First are so-called wealth management platforms[2]. They are essentially ERP solutions that provide automation for end-to-end wealth management process except of the service sales process. The platforms intended to include functionality of building a portfolio to allow wealth managers to free up time and to focus on increasing sales. Although, from the economical point of view, they are not platforms, but wealth management firms that hire third parties to sell their services. The second solution is "robo-advisor", which is the wealth management platform with online sales functionality.

Lack of competence metrics

There are three main values that affect the choice of a wealth manager: reliability, competence, and price. Reliability in terms of financial sustainability can be measured by credit ratings, but the supplier's integrity remains a matter of trust. With regard to the competence of individual investment management, there are no generally accepted methods of measurement and comparison, see §3.3. Since actual competency and reliability metrics are not calculated, they can not be delivered to the client and affect sales. In practice, wealth management service sales are driven by the brand. Branding and direct sales are so expensive that wealth management platforms receive just about 1% of total revenue for service.

Robo-advisory has been introduced in 2008[3] as a low-cost alternative[4] to wealth management services to take advantage of the market opportunity. By eliminating human input in sales process, they managed tp lower cost for 0,5% of NAV. Most robo-advisors charge an annual fee of 0.0% to 0.89%(see Table 2) of NAV, while human-driven wealth management service average fees are in the range of 0,5-2% NAV, and 5-20% of the profit depending on portfolio size.

---

[2] As for 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.

[3] 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) has been growing rapidly. By the end of 2017 the quantity of available robo-advisor services numbered of 100, while AUM amounted to $224 billion. Source: Statista.

[4] It is worth noting that as for 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 $5,000 as a standard baseline of minimum liquid assets to be able to use the service and is 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 performed by mutual funds but increasingly by the use of Exchange Traded Funds. However, this form of management gives the same exposure to all investors. Since investors have different investment goals and risk profiles, this uniform approach does not yield the appropriate risk/return ratio for each investor.

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.

Since quantitative measure of the competence of wealth management is lacking, robo-advisors and human-driven wealth management firms are still forced to bear the branding costs which are incorporated to the price of the service. Therefore, the current methodological uncertainty is detrimental to both investors and wealth managers.

However, it is known, all that objectively exists is subjectively measurable, even love. Wealthman is based on belief that consensus of investors on a methodology for measuring the effectiveness of wealth management along with a trustless protocol facilitating the recording of goals&results data will cause appearance generally accepted competency metric. Competency metrics will make individual investment management services quantitatively comparable, so that anyone could calculate the ratio of price and quality. This will lead to considerable consequences, such as the lack of distribution of demand by brand and improving the distribution of demand by service quality.

Trustless Wealth Management Technology Map

The basic technology for development of trustless applications is Blockchain. Blockchain is a distributed ledger of immutable chronological records that allows to store data and perform computations controlled by a decentralized consensus. The same as plain register accounts asset, the data in blockchain can represent value. Computations in blockchain are executed by rules known as smart-contracts[Nick]. Being under the control of the decentralized consensus, smart contract allows the community to avoids the need to involve a trusted party for the processing of sensitive data, and yet be sure that the processing rules will run exactly so, as they are written. This valuable feature has led some national and local governments to shift asset registers to blockchain [Georgia, Sweden, Illinois] and to legalize crypto assets. At the same time, companies began to be created in the form of Decentralised Autonomous Organizations [DAO], which are essentially smart-contracts emulating legal entities. These trends led to the emergence of tokenized form of each asset class and the task to manage investments in assets of such form.

We also target to reduce time-to-market and therefore intentionally seek to internalize mature technologies. On the left column of Table 3 outlined required functionalities to build trustless wealth management service, and in the right column are the names of solutions that have or could serve as a basis for development such functionality.

Table 3. Required functionalities for building trustless wealth management.

Required functionality	Approaches
1. Trustless choice of methodology of measurement of client investment goals achievement	*Preliminary tech:* Ethereum smart-contracts - production ready, RootStock, EOS - still not production ready.
2. Trustless avoid of conflict of interest	
3. Trustless marketplace of wealth management services	
4. Trustless assets storage	Blockchains with decentralized consensus: Ethereum, Bitshares, Stellar...
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 defence of data privacy	Enigma, Golem, SONM, Iexec, GridCoin - still not production ready
7. Trustless exchange of assets managed by smart contract	Bitshares, Etherdelta, IDEX, Bisq, Stellar - production ready, 0x, Loopring - still not production ready
8. Trustless financial data marketplace	Enigma, DDam, IOTA Data Market - still not production ready, Quandl,Benzinga - production ready, need trust

3. Challenge

The modern wealth management industry implies that customers must trust the competence and 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 manager, broker, and depository. Customers may face unfair actions against their interests, such as asset seizure, theft, "toxic asset" offer. etc. Table 4 presents the reasons and opportunities inherent to the business environment that encourage and enable an investment manager to do unfair actions against its customers.

Table 4. Reasons and opportunities of wealth manager to act against client's interest.

\<Reason\>	\<Opportunities\>	\<Method of Deception\>
- Financial distress. - Lust for money. - Negative impact of human factor. - Reward from issuer of investment product for choosing it instead of better one. - Politically motivated order for blocking and confiscation of assets. ...	- Lack of regulator requirements for disclosure of the effectiveness of individual investment management. - Right to exchange assets on behalf of client. - Inefficiency of judiciary to recover stolen crypto assets. - Subordination to the judicial and executive authorities. ...	- Restrict access to all investment opportunities. - Asset theft. - Selling "Toxic assets" from own portfolio or for reward from asset issuer. - Providing false data influencing the investor's decision. - Freezing or confiscation of assets by order of the authorities. ...

Going forward, we believe that the causes of unfair actions cannot be changed. So we decided to create counterweights to causes and change investment management environment so that fair actions was the best strategy.

3.1. Inefficiency of the judicial system in the fair protection of the register

- **Inability of the judiciary to recover stolen crypto assets**

Blockchain security methods use public key cryptography. It means that key pair is being used: one 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 the holder of the private key sent a message/transaction.

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

1. Execute transactions himself.

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

2. Hand over the private key to assets to the manager or third party responsible for execution.

The option faces inefficiency of modern judicial system. The latter fails in protecting against theft of crypto assets by asset managers, since only the owner of the private key can make changes to the blockchain-based registry. In the long-run, probably, the Global Court will be formed and special rights may be granted to make entries in the decentralized register. However, today the courts are localized and bailiffs do not have private keys. Therefore, they cannot alter the records in the decentralized registry.

- **The failure of the judiciary to confront the politically motivated blocking and confiscation of assets**

In order to satisfy the regulator's requirements, wealth management company can suspend its service for the client and unconscionably block/confiscate assets. Such events occur because of the centralization of the register of assets, and such center is under control of the executives and the judiciary.

Summing up, investors avoid the risks of confiscation by buying crypto assets. At the same time, wealth managers have no technical solutions to offer service so as to satisfy simultaneously the client needs for convenience and safety.

3.2. Conflict of interest between wealth manager and investor

Investors are used to believe that the wealth manager act in customers' best interests. However, several findings [GW] show that conflicts of interest occur [FSA] because of financial distress or lust for money [Greg].

Financial distress

Reasons of distress are very different - regulatory pressure, failed management of own capital, dependence on distressed affiliated parent or subsidiary financial structures (See Table 1).

Table 1. Distribution of the volume of the asset management market by AUM, %

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

Source: The Boston Consulting Group

Financially distressed wealth management company faces a choice, whether it goes bankrupt or survives at expense of its clients. This is usually expressed in two ways: by raising debt capital from investors and via the sale of toxic assets to investors.

Until now, the regulator [FSA] has sought to resolve such a conflict by subjecting asset managers to certain requirements, restrictions and guidelines, aiming to maintain the integrity of the financial system.

While dealing with on-blockchain assets, there are three cases in which the wealth manager can harm the investor:

- **investor transfers private key to wealth manager**

Execution process may require investor to transfer his private key to the asset manager, which potentially leads to fraud [Judiciary].

That is why Discretionary service as well as other kinds of services, which involve the need to transfer private key to execute transactions are unsafe.

- **investor gives wealth manager the permission to exchange investor's assets without reconciliation**

If investor omits the portfolio approval stage then investor has no opportunity to prevent the purchase of "toxic assets". Since the release of a new asset in Ethereum takes no more than 20 lines of code, the costs of creating a new crypto asset will be many orders of magnitude lower than the value of assets under management. The right of the asset manager to give orders for the purchase of assets carries the same risk of losing funds by the investor, as the transfer of the private key to the asset manager.

Unsecured sites of the business process of asset management
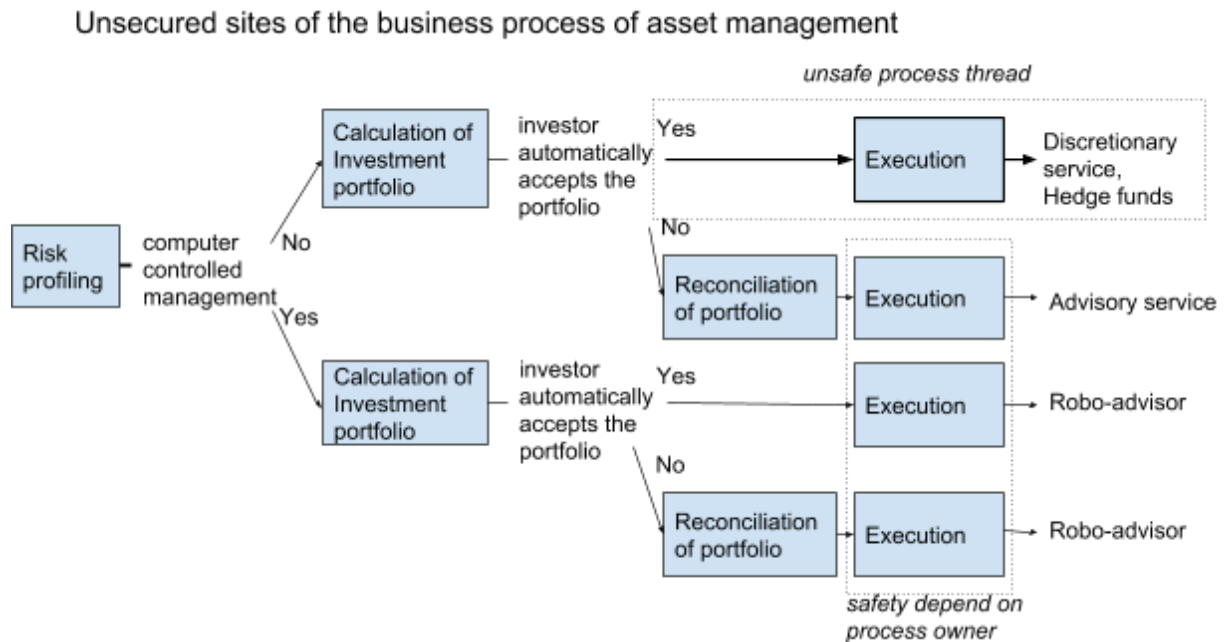
Smart contracts open up the possibility to replace legal protection with a technological one when it comes to a potential conflict of interest.

3.3. Lack of data on the effectiveness of individual asset management

Traditionally, measurement of asset management quality was provided by Fitch IMQ ratings [IMQR], Moody's MQ ratings and some less-known providers. However, they generally rate funds only.

Individual asset management assumes that the client always has his own defined parameters of duration, profitability, risk, saving currency, liquidity, etc. For this type of investment management, the market regulator did not compile a methodology for assessing the conformity of results to pre-set management objectives and no requirements to information disclosure. GIPS standards[G] are also measure the only performance of arbitrarily aggregated portfolios which are not comparable and don't take into account individual investment goals. That is why wealth management companies seek to convince in their competence through the disclosure of parameters, such as:

- Period of time they exist;

- Credibility of managers;

- Volume of assets under management;

- Investment methodology.

As a result, clients of asset management companies cannot see the correlation between the results of management and the goals. Previous finding [Pwc] shows that 55% of high net worth individuals are concerned about loss of the money. This demonstrates an excellent opportunity for the emergence of results-oriented marketing.

3.4. High minimum investment requirements

Qualitative human-based wealth management has a very high barrier of entry. Usually, a person must have at least $5 million[5] in liquid assets to be eligible for a traditional wealth management service. This is due to high compensation of asset managers, which, in turn, influences the level of fees.

In most case, individual investors require professional wealth management services in order to meet their financial objectives. At the same time, the market of wealth management services is targeted towards HNWI and UHNWI with high value of AUM, leaving the segment of investors with lower AUM underserved, including mass-affluent clientele.

3.5. Negative impact of human factor

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

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

These factors are unavoidable whenever a human is involved in the asset management. The good news is that the investment process is largely algorithmic. Moreover, the transition to computer-controlled asset management has been already underway[1]. The only barrier in this process is the capital intensity of programming.

---

[5] According to https://www.supermoney.com/reviews/wealth-management on 15.12.2017, minimum accounts were following: Goldman Sachs - 10 mln.usd, J.P.Morgan - 5 mln.usd, BNY Mellon Wealth Management - 2 mln.UBS Wealth Management - 0,5 mln.usd, Credit Suiss - 3 mln. usd.

4. Wealthman Solution

The goal of Wealthman is to create an alternative platform for building of advisory, discretionary and robo-advisory services for digital assets, containing the useful set of antifraud and marketing features. We are placing particular emphasis on situations where there is no trust of investor in wealth manager's competency and honesty, 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 application on top of blockchain protocol that capable to execute algorithms written on Wealthman's shared built-in high-level programming language. The application allows any user to start a secure advisory service or easily develop a decentralized robo-advisory. 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 skeleton of the Betterment service can be written in 200 lines, and a simple advisory service could be launched in 15 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 contract. Although this type of service can not be classified as safe, the investor's smart contract allows you to mitigate the risk by limiting the set of crypto assets, from which the manager can form an investment portfolio.

Several key 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. Allows a quality manager to save on the costs of marketing.	Quality of management Cost Savings

|		
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 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. Wealthman long term vision

In our long-term vision Wealthman is the most intelligent, safest and fastest platform for wealth management that gains accepted industry-wide. It is our belief that decentralized autonomous robo-advisors based on smart contracts will dislodge centralized robo-advisors, hybrid- and human-driven wealth management service. Registers of assets will be decentralized. Thus, the decentralized robo-advisors will dominate the market of wealth management services.

4.2. Wealthman Architecture

Glossary

User - participant of the Wealthman platform, that have one of the roles: Investor, Wealth Manager, Token Holder, Data provider and Development team.
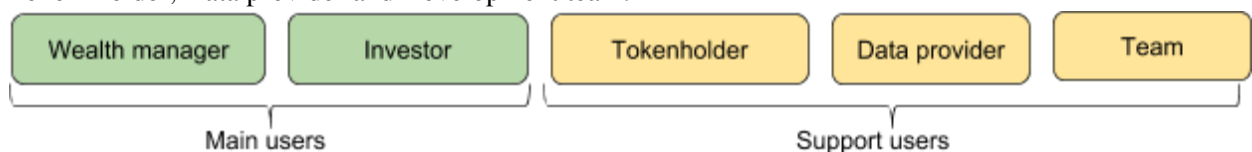
Wealth manager - individual or organization who intends to provide individual investment management service personally or through a portfolio rebalancing algorithm.
Investor - any person or organization that commits capital with the expectation of financial returns.
Token Holder - anyone who holds AWM tokens, issued by Wealthman DAO.
Data provider - any Token Holder that is accepted to provide at least one data series to Wealth managers.
Development team (Team, Developer) - team that develop Wealthman platform.
Service - individual asset management service provided by wealth manager in any form.

Wealthman consists of the following modules:

- Interface environment;
- Identify, key management and encryption service;
- Business logic execution environment, which includes:
    - Service/Algorithm creation and testing environment;
    - Investor's business logic environment;

- Service/Algorithm execution environment;
- Wealthman management environment.

Interface environment

| Wealth manager web&client interface | Investor web&client interface | Tokenholder interface | API Developer Interfaces |

Identity, key management and encryption service

Business logic execution environment

Service creation and testing environment
- Wealth manager interface backend
- Service ranking unit
- Algorithm testing unit
- Wealth Manager Contract

Investor's business logic execution environment
- Investor Interface Backend
- Algorithm calculation unit
- Investor Contract

Service execution environment
- Wealthman DEX Market maker
- Wealthman DEX

Wealthman management environment
- Wealthman DAO contracts

Blockchain

Data storage environment

| Service description files | Encrypted Algorithm database | Data series | IPFS fork |

Basic data types:

- List of Tokenholders
- Accepted data series
- Wealthman Remuneration settings
- Database of encrypted algorithms
- Service description files (team description, ranking, etc)
- Data series
- Accepted algorithm code
- Service rank
- Wealth manager open keys
- Service offer settings (fees, termination rules)
- Investor open keys,
- Investor's portfolio calculation& execution parameters
- Investor assets transactions
- Portfolio Acceptance and execution status
- List of orders to buy/sell tokens
- User ID, Assets ID
- Queue of all orders to buy/sell tokens
- List of declined orders

● Assets transfer orders

Data flow diagram:
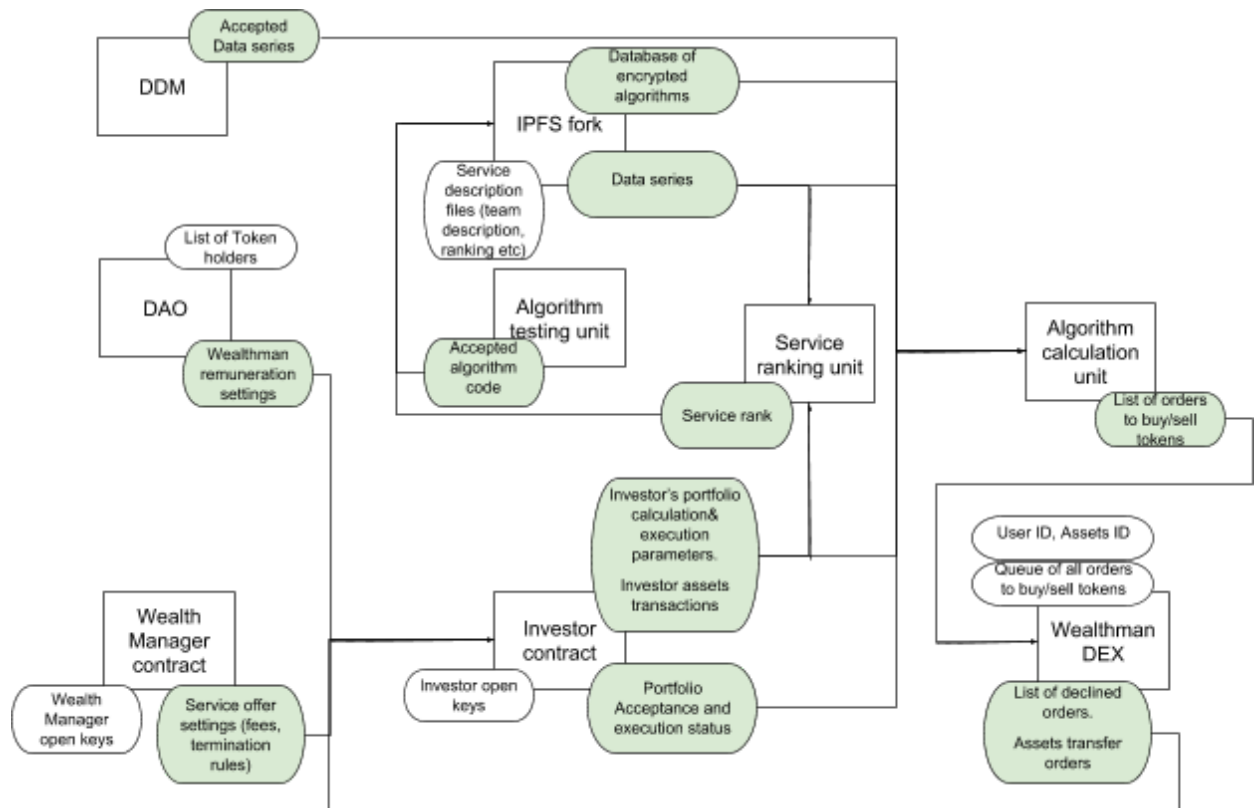
Money flow diagram:
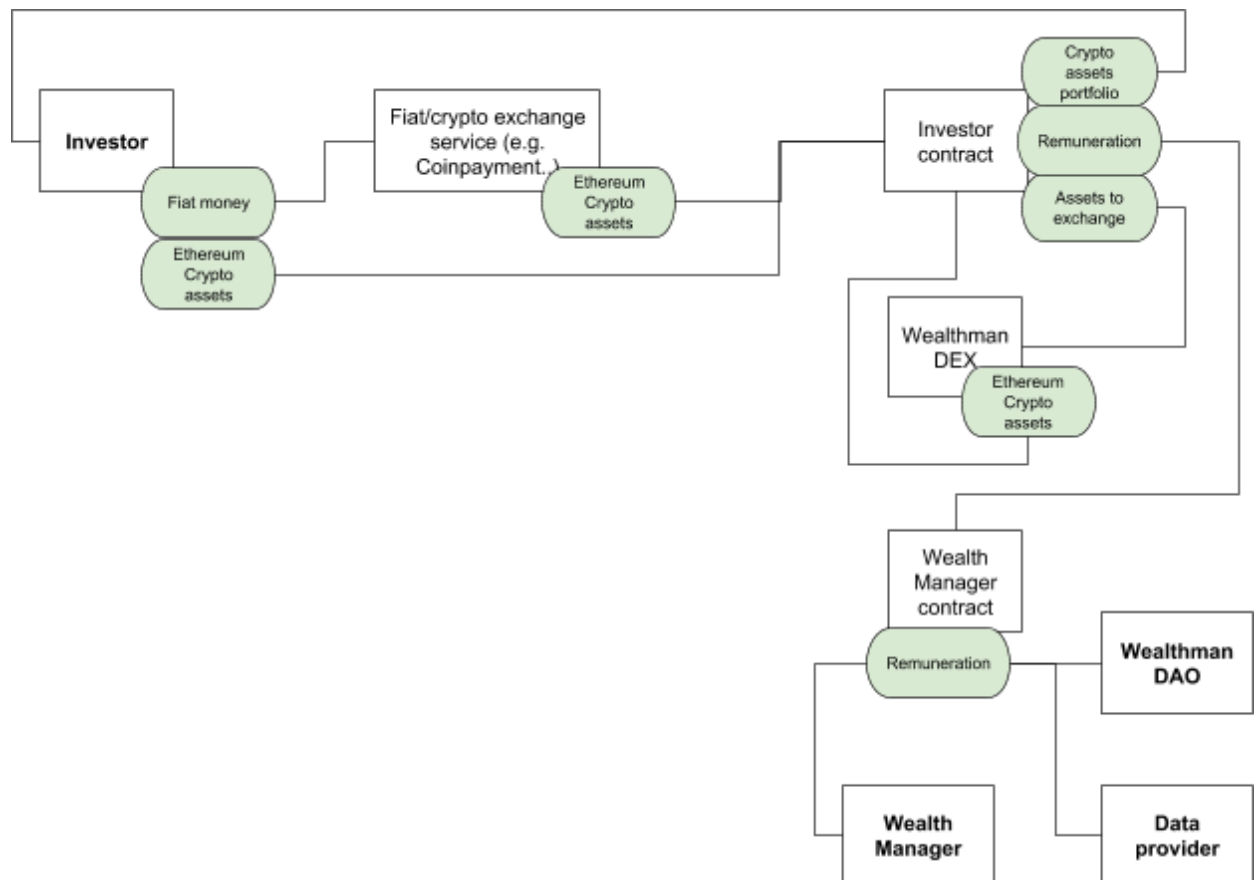
4.3. Interface Environment

Interface Environment Includes a web UI and applications for mobile devices for both investor and wealth manager, desktop application for Algorithm development by wealth manager, API interface.

Interface for Investors is used to

- show multiple criteria for choosing right wealth manager, such as ranking, management costs, service description,
- show portfolio dynamic/statistics,
- show investment propositions from wealth manager, to form and send a message of it acceptance, (in advisory management mode)
- to withdraw assets.

Interface includes:

- Private key pair generation;
- Language localization depending on the IP address;
- List of wealth managers or algorithms that have passed the testing & ranking procedure with description of service provision conditions;
- Risk & goals profile function;
- Asset management reporting tool;
- View portfolio offered by wealth manager for acceptance (in advisory management mode);
- Function of concluding a smart contract for Service (Investor contract);
- Function of communication with the Investor contract (risk profile changes, portfolio acceptance, withdraw money, etc.).

Interface for Wealth Managers is used to

- show results of asset management in different sections,
- let wealth managers develop and upload new algorithms,
- change service description parameters (fees, team description, etc.),
- gain access to data series necessary for provision of service,
- send investment propositions and trade orders.

Interface includes:

- Private key pair generation;
- Language localization depending on the IP address;
- Algorithm development environment;
- Service provision reporting tool;
- Function of communication with the Investor contract and Wealth manager contract;
- Data acquisition unit.

Interface for Tokenholders, Data providers is used to:

- voting for settings or strategy changes by Tokenholders (by default, a simple majority of votes out of those who voted for a decision);
- offer a series of data for use by the wealth managers;

Interface includes:

- Private key pair generation;
- Language localization depending on the IP address;
- Interface for sending wealth managers inquiries to retrieve data;

- Voting and decision-making system interface.

API Developer Interface
In version 2.0 of Wealthman platform we will add Developer Interface (API) to provide an access to outside systems.

4.4. Identity, key management and encryption service

The module includes security components, such as identity information, key management services, encryption, gateway services of the distributed registry. It allows to manage investor's funds, keys, and other private information.

4.5. Service creation and testing environment

The module includes the Service ranking unit, the Algorithm testing unit, the Wealth Manager interface backend that supports Algorithm development environment.

Wealth Manager interface backend
The unit supports Algorithm development environment which allows Wealth Managers to create their own algorithms.

Algorithm Testing Unit
Testing unit is designed to test newly uploaded algorithms. Testing is carried out on the basis of historical data series. The purpose of testing is to identify intentional or accidental errors in the code and conditions in the algorithm that can obviously lead to losses or to conversion of funds to illiquid assets. If the test is successful, then the algorithm becomes available on the platform. Testing Algorithm will be open sourced to allow Wealth Managers and investors be sure they can trust the results.

Service ranking unit
Ranking unit calculate estimates of the quality of asset management. Rank measures the level of achieving of the investor's goals by Wealth Manager.

Wealth Manager Contract
- Recording of the algorithm hash;
- Recording the terms & conditions of service offer (remuneration, rating, etc.);
Conditions for the implementation of the smart contract:

- Terms of sale of service (wealth management service remuneration);
- Terms of distribution of manager's earnings (Wealthman platform remuneration, blockchain fees, data feed fees, etc.);
- Investor contracts ID;
- Wealth Manager ID;
- Algorithm hash, and PGP open key to algorithm.

4.6. Investor business logic environment

The Investor business logic environment is used to allow Investor purchase Wealth manager's competence and manage assets in secure way. It consist of the Investor interface backend, Algorithm calculation unit and Investor contract.

Investor interface backend

The unit is used to prepare and deploy Investor contract that regulate relationships between Investor and Wealth Manager.

Algorithm calculation unit

The unit is used to calculate the new optimal structure of the investment portfolio in robo-advisor mode, as well as trade orders to bring the current structure to the optimal.

Investor contract

This Smart contract is used to:

- Keep assets;
- Form a task to calculate and rebalance investment portfolio;
- Record investment proposition from Wealth Manager;
- Record status of acceptance of investment portfolio by Investor;
- Keep records of management results and management costs (e.g. calculation costs to ledger, data feed costs, and wealth manager remuneration for algorithm);
- Re-profiling of the investor.

Conditions for the implementation of the smart contract:

- Remuneration parameters of Service;
- Fees (Wealthman remuneration, blockchain fees, data feed fees, etc.);
- Portfolio rebalancing period;
- Duration of the contract;
- Investor profile parameters;
- Access to investor's portfolio assets;
- Period and conditions for the recalculation of the investment portfolio;
- Investor ID;
- Wealth Manager ID;
- Current status of the trade orders execution;
- Current income statistics of the selected algorithm;
- Current structure of assets.

4.7. Service execution environment

The Service execution environment is used to execute orders for exchange of crypto assets. It consist of Wealthman DEX market maker and Wealthman DEX.

Wealthman DEX market maker
The unit is used to provide liquidity for Wealthman DEX.

Although, any person can trade in the Wealthman DEX, at the initial stage, there will be few arbitrageurs and bidders who can provide enough liquidity for Wealthman DEX. Therefore, the role of the provider of liquidity is assumed by Dex Market Maker.

Dex Market Maker is an ordinary DEX participant. It is a centralized robot that, by a series of simple transactions, drags assets from centralized exchanges to a secure environment of Wealthman DEX:

- acquisition of necessary assets on centralized exchanges;

- transferring the purchased assets into a safe environment Wealthman DEX;

- setting up a bid and ask quotes in Wealthman DEX;

- withdrawal of the sold assets from the safe environment of Wealthman DEX to a centralized exchange for the restoration of limits.

Wealthman DEX

The unit is used to exchange tokens in a secure way. Initially, we plan to use existing decentralized crypto-exchanges as the basis for the execution of transactions.

After implementation plan is complete, we will develop our own decentralized exchange contract on the basis of blockchain-based smart contract, in order to make it cheaper to execute transactions. The most basic transaction types will be supported at the core level, which include:

- custom token creation, deletion;
- token transfer both inside and outside,
- placing the order for the exchange of assets in the queue,
- execution of matched bid and ask orders.

Next optional key development points of Wealthman DEX:

1. Front-end for Wealthman DEX participants;
2. National (or alternative crypto) currency are transferred directly from one user's payment account to the others payment account without any intermediate party.
3. Support for alternative cryptocurrencies;
4. Decentralized arbitrator system as primary protection mechanism;
5. Open source license;
6. Fraud reports as protection against bank chargebacks and crime (stolen payment account).

4.8. Wealthman management environment

AWM Tokenholders and Development Team (hereinafter referred to as Team) control Wealthman through Wealthman DAO. It is a smart contract, in which all functions run on top of Ethereum,

Wealthman DAO is used to:

- manage of platform settings (remuneration, the level of the data provider's pledge, etc.);
- maintain list of accepted series of data;
- mint AWM tokens during token generation event;
- burn AWM tokens;
- store funds and tokens and transmits them based on the code (e.g. lock AWM tokens of Data Provider).

5. Wealthman Tokens

5.1. AWM token functionality

AWM token is a ERC20 token issued by Wealthman DAO and is used as

- fees to Wealthman DAO for such platform microservices as reporting, contract creation;
- 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.

5.2. AWM token valuation

AWM tokens are intended for use within the Wealthman platform, their 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 $t + 60 \: days$, 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.

6. References

[1] "Blockchain innovation in wealth and asset management", EY, www.ey.com http://www.ey.com/Publication/vwLUAssets/Blockchain_in_wealth_and_asset_management/$File/ey-blockchain-innovation-wealth-asset-management.pdf

[2] SOTICS 2012: The Second International Conference on Social Eco-Informatics

[3] "ERC20 Token Standard", The Ethereum Wiki
https://theethereum.wiki/w/index.php/ERC20_Token_Standard

[Nick] Nick Szabo. Smart Contracts: Building Blocks for Digital Markets.
http://www.fon.hum.uva.nl/... Accessed: 2018-03-09.

[Bet] https://www.betterment.com/

[FSA] http://www.fsa.gov.uk/static/pubs/other/conflicts-of-interest.pdf

[G] https://www.gipsstandards.org

[Georgia] Shin, Republic Of Georgia To Pilot Land Titling On Blockchain With Economist Hernando De Soto, BitFury, available at http://www.forbes.com/sites/laurashin/#1143578f655d

[Greg] "Why I Am Leaving Goldman Sachs", Greg Smith
http://www.nytimes.com/2012/03/14/opinion/why-i-am-leaving-goldman-sachs.html?_r=1&pagewanted=all

[GW] David Maude, Global Private Banking and Wealth Management, 2006, p.14,47,48,120

[HF] https://www.nifc.gov/fireInfo/fireInfo_documents/humanfactors_classAnly.pdf

[DAO] Decentralized Autonomous Organization.
https://en.wikipedia.org/wiki/Decentralized_autonomous_organization

[Illinois] Michael del Castillo, Illinois Unveils Blockchain Policy
https://www.coindesk.com/illinois-blockchain-initiative-policy-regulation-bitcoin-blockchain/

[IMQR] Fitch Investment Management Quality Ratings.
https://www.fitchratings.com/site/re/893989

[Pwc] https://www.pwc.com/sg/en/publications/assets/wealth-20-sink-or-swim-gx.pdf

[Soe] Soe, M., & Poirier, R. "SPIVA® US Scorecard." S&P Dow Jones Indicies. (30 June 2016). Web PDF. https://us.spindices.com/documents/spiva/spiva-us-mid-year-2016.pdf

[Sweden] Chavez-Dreyfuss, Sweden tests blockchain technology for land registry, available at http://www.reuters.com/article/us-sweden-blockchain-idUSKCN0Z22KV

[WEALTH] Fowler, William Franklin (1933). *Fishermen and fish: A sequel to For America, an interpretation and plan*. Lynbrook, N.Y: W.F. Fowler. p. 38. Retrieved 2013-01-30. To the inefficiency of political control of government, which is the principal cause of unsound conditions, they would grant the additional authority and responsibility of wealth management.