

# IOVO

INTERNET OF VALUE OMNILEDGER

Whitepaper, v. 0.1

IOVO (Internet Of Value Omniledger) is a global open protocol for the storing and exchange of information of all types on possible nonmonetary quantitative data assets. The IOVO DAG (Directed Asymmetric Graph; next generation blockchain) serves as a scoring (rating) ledger by creating a universal global decentralised ledger of all data, which then publishes scoring rates on both individuals and institutional entities across a range of sectors. Rating scores within IOVO are solely accessible to the scored entity itself, and are revealed upon request only as answers to particular questions (IOVO acting as a zeroknowledge-proof platform).

IOVO allows users and companies to own their data and decide what is revealed and on what terms via their personal scoring data wallet. Being the first truly transparently public and globally universal personal and institutional decentralised database, IOVO serves as a global ledger on every type of knowledge about individuals and all entities. It stores and supplies all possible scoring features (protocols) for different market and social applications. It is encrypted, secure, distributed, democratic and above all human-centric. That said, IOVO has the capability to reach a broader scope than just people. It is a database of all possible scoring scales and information, serving as a base layer for future decentralised data market makers.

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„Probably money was generated not with respect to its intermediate function for exchange but as a sign for unbalanced performance ratios, first probably in household economies“

- Niklas Luhmann

“We’ve forgotten that if we don’t pay people, they can’t buy our products; they can’t respond to our ads. So there’s a problem with the algorithm that we’re using to run modern businesses“

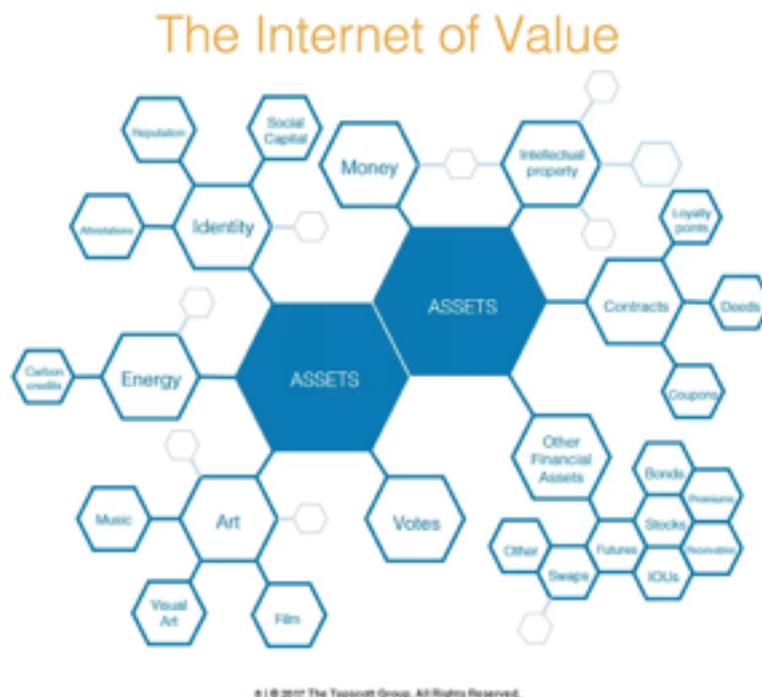
- Tim O’Reilly

“Because if I can create more value than I should be benefiting from it. Salaries are antiquated incentive structures. Blockchain will change the model“ - Disruption Joe “What would happen if there were an internet of value where parties to a transaction could store and exchange value without the need for traditional intermediaries? In a nutshell, that’s what blockchain technology offers“

- Don Tapscott and Alex Tapscott

## 1. INTRODUCTION

The emergence of the Internet of Value (IoV) is both an opportunity and a challenge for the future of human value measurable via different types of scorings. As witness the rapidly growing of industry and services automation across all sectors, intrinsic human value further loses significance. The Internet Of Value Omniledger (IOVO) is a DAG (Directed Asymmetric Graph; next generation blockchain) designed to record and store all future human capital and scoring-centered unmonetised personal assets exchange in the future world of diminishing nominal price (value) and reduced role of fiat currencies in the global economic exchange system.



The world is being conquered by automation (tech, AI, machine learning) and human value is under threat. As value shifts aggressively to the material economy of industry, along with the colonisation of services by automation and rapidly developing AI technologies, blockchain offers real hope to sustaining human value in danger of being undermined. It is estimated that by 2025, as much as 70% of all possible markets in the world will rely on blockchain technology. IOVO recognises and stores inalienable human value by accumulating scorings. It makes it an exchangeable asset secured by the distributed global public ledger. The tools built on the IOVO DAG will finally allow the community to benefit from all types and all areas of unmonetised personal human capital captured by different types of scoring.

## 1.1. THE COMING OF THE INTERNET OF VALUE (IOV)

The world is a system of human exchange and the Internet has made different exchanges possible so far. From early commodity exchange and the network of ledgered favour liabilities to modern capital markets lubricating global economies (the system of information, services and commodity exchange) have served human progress and socioeconomic fluency. The system of exchange developed concurrent to the progress of human civilisation, becoming more and more complex and thus consequently detaching itself from intrinsic human value. As with all possible systems, any history can be described as a timeline of the growing complexity of a certain system. Until now, the Internet facilitated the exchange of information and some sort of intermediate value - from monetary transactions via mobile banking to social significance markers in humanity's social media platforms. Social and economic exchanges were facilitated by money accompanied by ledgers, a human invention dating back to when the pace of civilisation gained speed and expanded into its complex character. With time, the invention of money detached itself from the original value of human assets and services and the exchange of commodities, becoming an independent system unto itself. In time, this system came to rule the economy, developing subsequent feature instruments and gaining unprecedented influence over all social and economic processes. As a result of this process, whereby money has come to wield power over the socioeconomic global system, human value has been alienated and we are now entering a stage when its future is being decided on.

The emergence of what is possibly the final element of the global Internet exchange network, the Internet of Value, creates a great opportunity to return to immanent human value present at both the individual and community level. The rise of the automated machine economy, machine learning and AI services will either eventually dominate all socioeconomic systems or serve the exchange of valued human assets, such as influence, knowledge or time.

## 1.2. THE END OF NOMINAL MONEY

Until today, the economies of the world and the global economy of exchange have been founded on the nominal value principle. The concept of nominal value, developed to facilitate the exchange of commodities, attaches a fixed price to a variety of goods, supplying the illusion of a universal, objective value of goods and services to the mass market. This concept was developed on the basis of available technologies, e.g. the early material "value carriers" such as stones and shells and characterised by their conceptual limitations. Thus, money was originally a ledger itself, as it stored information on liabilities and debts taken in order to facilitate short- and long-range exchange. With time, the system of money became more and more complicated, as well as detached from its original functions of ledgering and exchange. The fundamental function of money was to trace debt, create a universal exchange rate (generalised medium of exchange) and lubricate the economic system of exchange. The very existence of the medium of exchange for debt amortisation and payment making creates nominal universal value (e.g. price). Money as we know it, as liability ledger and nominal value marker, will come to an end when an easy-to-use technology will allow direct exchange of nonmonetary assets valued at the best price offered. First of all, the millenia-old concept of nominal price does not optimally serve the current economic reality in the world (online auctioning e-commerce platforms being just one of the examples). Secondly - money, the current banking system and the transactional frameworks of payments still create great exchange friction. The governance of friction belongs to states and banks and lead to destabilisation by upholding an unstable rate and value system. Money created as a lubricant enhancing productivity and innovation is the most common, most ubiquitous and the most invisible friction. Thirdly, the real money-intermediated exchange of goods and services is still conservatively asymmetric because it doesn't take the paying side value into consideration. By developing a global meta-scoring DAG platform, IOVO will facilitate the coming of post-nominal transactions and dynamic price adjustments to accessible scoring ratios.

### 1.3 MONEY AS A SOCIAL SCORING SYSTEM

Money is a tool for the reproduction and modification of social structure and stratification. It is one of the oldest and the most efficient tools building up the hierarchies of human societies since the very inception of social systems and cultures. It defines our realities on micro and macro levels. Money is, therefore, the oldest systemic and person-detached social scoring system - one that has ushered in human progress and made social systems more and more complex throughout the ages.

In the near future, nominal value as a common denominator and numeraire will be replaced by a more direct and decentralised exchange of value(s). The traditional money social scoring system will give way to new balancing tools for performance ratios. There will be no further intermediaries as all the transaction will be direct and ledgered distributively. Lachmann-inspired views of the economic system as an evolving process of spontaneous order will prove true in the coming postmonetary barter-like reality. Within the nominal price money paradigm created as a lubricant enhancing exchange, productivity and innovation are the most invisible friction. Barter economies were primed for the money economies that succeeded them. Money overcame the largest barter-economy issue that occurred - the need for direct transactional contact between two sides willing to exchange certain assets and therefore (by becoming a universal intermediary) overcame the so-called "double coincidence of wants". The term of "double coincidence of wants" was originally coined by W.S. Jevons in 1875:

*"The first difficulty in barter is to find two persons whose disposable possessions mutually suit each other's wants. There may be many people wanting, and many possessing those things wanted; but to allow of an act of barter, there must be a double coincidence, which will rarely happen. A hunter having returned from a successful chase has plenty of game, and may want arms and ammunition to renew the chase. But those who have arms may happen to be well supplied with game, so that no direct exchange is possible. In civilized society the owner of a house may find it unsuitable, and may have his eye upon another house exactly fitted to his needs. But even if the owner of this second house wishes to part with it at all, it is exceedingly unlikely that he will exactly reciprocate the feelings of the first owner, and wish to barter houses. Sellers and purchasers can only be made to fit by the use of some commodity, some merchandise bundle, as the French call it, which all are willing to receive for a time, so that what is obtained by sale in one case, may be used in purchase in another. This common commodity is called a medium, of exchange, because it forms a third or intermediate term in all acts of commerce"*

### 1.4. THE EVOLUTION OF MONEY

Money as a direct response to the "double coincidence of wants" issue freed the human economy from the impossibility of finding a second matching transactional side. Thanks to the innovation of money and this innovative indirect exchange system the market was created as an origin of a worldwide exchange market system we know today.

#### **MONETARY 1.0:**

classic money, ~1971, strong nominal value, horizontal exchange, commodity (gold) standard reference, banking frictions, commissions.

#### **MONETARY 2.0:**

fiat money; 1971-2010; horizontal exchange; friction from banks, establishment, spreads, rates, commissions, etc.

#### **MONETARY 3.0:**

cryptocurrencies; 2010-2020; horizontal exchange, friction from cryptocurrencies, intermediaries, commissions and volatility due to lack of real world economy foundations.

#### **MONETARY 4.0:**

direct asset value exchange; 2020-?; decentralised un-governed exchange, defrictionalised, no intermediaries or additional transactional costs, value attached directly to real-world existing assets.

## 1.5 THE NEXT INTERNET

The Internet as we know it that is about to come to an end. From the very beginning, the Internet as a global connectivity platform facilitated previously existing social mechanisms and elements of social system operations that can all be described as exchange - exchange of information and data. The next Internet - the Internet of Everything - will bring global exchange connectivity to a new level: a level that will not only allow full exchange between subject and things, but will also allow a comprehensive exchange of value in all fields.



(Source: RomAudioVideo)

The Internet came with the promise of a total reduction of intermediation (tool of governance), but eventually it absorbed old paradigms and reintermediated all processes of exchange.

*"If disintermediation occurs when an established intermediary is forced out due to structural change, reintermediation is the process by which a disintermediated institution is reestablished in the new environment"* say Ian Domowitz, Mary Jean and Frank P. Smeal Professor of Finance in Penn State's Smeal College of Business Administration and immediate past-chair of NASDAQ's Economic Advisory Board. The friction economy and the monetary system that lubricated it are now an anachronism in the exchange economy perspective. In fact, all forms of exchange friction are an anachronism as they not only slow down the exchange processes but also create an environment unfavourable to all transactional sides that depend on the liquidity of the processes owned by particular intermediaries.

## 1.6 THE RETURN OF HUMAN VALUE

Human value is much more than money, but capitalism limits the understanding of human value to the measure of money. Over the course of technological progress that occurred between the mid-20th century and today, the value of material instruments has risen unprecedentedly. From early computers to modern interconnected electronic equipment, things have risen in value and conquered subsequent areas of human life. From early personal computer solutions to iPhone X, technology has both facilitated our daily lives and re-intermediated almost all fundamental processes of our lives. Capitalism run by markets - just as predicted by multiple conservative and liberal scholars - automated agriculture and industry, while largely democratising the services sector. The value of products and processes has thus further overgrown the value of human subjects. At this stage of history and socio-economic development, we now face the urgent need to decide on our future in an automated world of AI machines. The 'universal basic income' that is the topic of much lively public discussion is just an example of the dangerously escalating global challenge that we face as a result of diminishing of human

value. As the Silicon Valley futurist Tim O'Reilly has stated: "We've forgotten that if we don't pay people, they can't buy our products; they can't respond to our ads. So there's a problem with the algorithm that we're using to run modern businesses". The new economy that is now being born is more and more often referred to as the fourth phase of industrialisation. The coming period in history will take full advantage of many possible technological advancements, eventually the full automatised of all industrial and most service-centred global economic systems. In this rationale of progress, human value will further diminish if no tools serving its ledgering (storage and exchange) are developed and spread worldwide. The answer to this civilisational challenge lies in the instruments of exchange that shape the global economy and further limit the significance of human value within the global economic exchange. At this stage in history, we ought to decide whether we will develop tools and instruments that allow for human value to flourish or put try to ignore the impact of further automation processes that lead to future zero-dependability on the full spectrum of economic process on human capital and value.

The historical background of technological solutions to the human value challenge are presented in subsequent parts of this document. An overview of the project structure is shown below:

## GLOBAL LEDGER OF HUMAN VALUE

LEADING MARKETING PARADIGM	ATL, BTL, PR Marketing	Direct and loyalty marketing	Digital marketing	Social Media marketing	Influencer marketing	FAYM Influencer marketing transactional integration
	Information economy	Exchange economy	Social economy	Sharing economy	Influence economy	influnomy
	Internet of Information I N T E R N E T				Internet of Things O F E V E R Y T H I N G	
PROGRESS OF CAPITALISM	First, Second Industrialisation	Third Industrialisations		Fourth Industrialisations		

### 1.7 IOVO DAG: THE INTERNET OF VALUE OMNILEDGER

**CHALLENGE:** Disappearing human value and deepening human redundancy in late capitalism due to the progressive automation of industry and services.

**SOLUTION:** A universal global human value registry based on an underlying distributed ledger that stores and allows for the exchange of all immaterial human assets.

Capitalism accounts for money and debt, thus making them real and valuable. Nonmonetary human assets are progressively deprived of real value due to the lack of a real and publicly trusted ledger. What is not on a ledger, does not exist - everything that has no underlying ledger, has no value.

The Internet of Value Omniledger (IOVO) is a universal global DAG dedicated to publicly storing the transactions of nonmonetary asset exchange. As such, the IOVO will drive nonmonetary human capital asset values as a main course of interchangeable services with a proof of trust protocol to establish a publicly recorded ledger of human capital markets. It is conceived to provide the capability to search, find and implement a secure human value storage framework for direct exchange of unmonetised human assets. Within this global social distributed ledger everyone will be able to benefit from non-intermediated assets, monetising their intrinsic human capital which is neither present, nor acceptable, in the old economy market. The emergence of the Internet of Value, and the Influence Economy within it, will not only recognise the personal human asset capital - it will change the economic reality we were born into, raised into and shaped by.

Reciprocal social transactions are limited because of their lack of a registry. With the Internet of Value, there comes a great chance to finally include nonmonetary exchange into the global economic system. IOVO will thus recognise the inalienable worth of human value and make it an exchangeable asset secured by the distributed global public ledger. Everyone will be able to benefit from unmonetised personal capital that is not recognised in the traditional economic market.

### **Closing the Internet circuit - digitalisation of human assets value**

The expansive nature of the world wide web made information and knowledge major sources of wealth in recent history. "The Internets" of information and things (automatisation, machine learning, AI) almost liquidated the friction of time and operational agency. However, the inability to transfer value between agents turned the Internet's initial promise of total freedom into a centralised panoptical (intermediation as surveillance) prison.

The IoV will close the global exchange circuit. Together with the "two first Internets" (Internet of Information and the subsequent Internet of Things) the Internet of Value will compose the near-future Internet of Everything. Thus, it will become a comprehensive support for the whole global social exchange system, not just parts of it as was the case before. It will become not a parallel reality, but a comprehensive layer of the world's socio-economic reality itself.

IoV will allow the open trust paradigm to come to life as an obstacle-diminishing, direct economic system. It will go way beyond brand influencing and come closer to a global ledger of liability and favours, a nonmonetary exchange system in which everything is public and transparent. The Internet of Value Operate (IOVO) will be its currency, however it will not carry all the prior monetary burdens because it will record and make public all transactions and liabilities. At its core will lay the idea that all transactions and actions of exchange will be free of intermediaries. All nonmonetary assets will be made accessible for exchange among one human or equipment network. The nonmonetary exchanges functioning will be followed by the IOVO value that influences the scoring ratios.

### **IOVO as the Internet of Value ledger**

IOVO is a DAG for building all platforms and apps based on intrinsic human value, in all particular fields. The creation of IOVO as both direct currency and transactional system (wallet, public ledger) aimed at expanding nonmonetary (or not yet "fiated") assets attached to different types of individual human capital into directly interchangeable values. The focal system of trust is build and maintained in the form of DAG - the next generation Blockchain. The IOVO DAG as a trust protocol will serve as a 'zero knowledge proof' based on audited scoring algorithms (i.a. credibility, influence, know-how, network).

The IOVO DAG encrypts deep learning-based scoring algorithms in separate dimensions, i.a. credibility, influence, know-how or network. It is a ledger of human value and different types of capital (social, cultural).

## **1.8 DATA OWNERSHIP AS FREEDOM**

The behaviours of all individuals and other entities creates enormous amounts of data. Data is the registry of all kinds of existing phenomena and as such, it is collected and appropriated by large commercial organisations. People and institutions don't own their data and the ownership of personal data can be understood as claiming ownership over one's life. Personal data ownership is therefore freedom. The data generated from every behaviour is the registry of life and therefore stores the intrinsic human value that should be attached and owned by every individual. The human value and capital of every person is stored in the life data generated, transferred and shared with others. The loss of one's personal data equals the loss of ownership and control over the registry of one's human value and therefore one's potential of freedom. Data loss limits operational human capital and possibilities to monetise one's human value by different forms of exchange, because data indicates the nonmonetary human capital understood as one's potential. IOVO is designed to allow individuals and entities to reclaim their data, bring back it's ownership and secure it. It facilitates and automates the process of own(ed) data management and monetisation. As a base layer, the IOVO DAG works as an infrastructure for all upcoming DAPs focusing on scoring data usage (finance, credit, insurance, nonmonetary payments). IOVO's goal is to democratise the monetisation of data for all participating parties.

## 1.9 FUNDAMENTAL IOVO DAG FEATURES ADVANTAGES

The presence of the missing link of internet (Internet of Value) will close the circuit (Internet of Everything) of global exchange by introducing a fully operational peer-to-peer decentralised asset-value exchange paradigm to everyday life. The IOVO DAG is additionally designed to close the global circuit of goods and services. With time it will enable complete exchange - a real-time exchange, in which all assets carrying any possible value, be it material or immaterial, will be seamlessly and directly exchanged. Finally, value will be not only tradable but also interchangeable thanks to a decentralised blockchain technology. The decentralisation brought by IOVO is embedded not only in the socio-economic change it brings to the world of personal/institutional data and beyond, but can be easily indicated within its technological characteristics. IOVO is not a closed system but rather a fundamental infrastructure for all kinds of decentralised applications development. Future creators and implementing teams of all possible DAP will have boundless liberty in establishing their rules of usage, while IOVO will serve as a supplier of tools and informational infrastructure.

IOVO acknowledges Ethereum's contribution as a DAP platform to date, allowing data data storage and and creating contracts from the transaction scripts. However, the DAG technology used for IOVO has multiple advantages over the now-popular Blockchain, which include transaction speed and fees. More information regarding this issue and other IOVO DAG advantages over Blockchain can be found below in the subsequent parts of the document and e.g. in the IOTA whitepaper. The economy of value, especially human value, is the missing piece in the scope of the Internet. The coming of the Internet of Value (IoV) will close the global circuit of exchange. The fully operative Internet of Everything has a chance to become the true Internet of Freedom, bringing an end to nominal price and handing back value to the personal human capital. IOVO token attaches the value directly to asset, not the nominal intermediary. It is a unmonetised human capital asset protocol and will become an exchangeable token within the open protocol of the human unmonetised assets economy.

### THE IOVO DAG:

- A global ledger designed for scoring and storage of intrinsic human capital. Serving as both 'zero knowledge proof' and public ledger of exchangeable asset-values.
- Direct reinforcement of social ties structure, bonds and unquantifiable relation-based value transfers.
- Systemic framework allowing human capital monetisation on distributed ledger.
- IOVO smart contract as basis for DAPs (market making) and wide-use everyday tools, e.g. FAYM app by influnomy.

## 2. STRUCTURE OF IOVO

### 2.1 ADDRESSES

The IOVO system consists of users and transactions carried out between them. Every user is assigned a pair of cryptographic keys | a public key which serves as an address and a secret key used for signing transactions.

### 2.2 TRANSACTION DAG

The backbone of IOVO is a system of fast and free-of-charge transactions. The transactions are organized in the directed acyclic graph (DAG) structure, a new concept first proposed in cryptocurrencies like Dagcoin/Byteball [1] and IOTA [2]. In IOVO we use a structure similar to the one used in IOTA (they call it a tangle). However we have extended it with scripts that allow users to create and run Ethereum-like smart contracts [3] and scorings - IOVO's primary feature, which serves as a base layer for all possible nonmonetary value applications.

The transaction DAG can be seen as a natural successor of blockchain first introduced in Bitcoin [4], however it has no chain and no blocks. Instead, every transaction is a node (site) in a directed acyclic graph in which an edge  $A \rightarrow B$  means that transaction A directly approves transaction B. Unlike blockchain, in the case of a transaction DAG there is no need for miners to approve transactions. Instead each user, in order to issue a new transaction, must approve  $k_0$  existing transactions<sup>1</sup>. For further details about the transaction DAG, please refer to [2].

## 3. FUNDAMENTAL OPERATIONS IN IOVO

### 3.1 SENDING CURRENCY AND MESSAGES

The most basic type of transaction in IOVO is a transaction with value and a message. The user specifies how much IOVO-coins (IOVO currency) he wants to include in a transaction. He can also add a short (say, 128B) message to it. Since all the transactions are kept public, this message will be visible to all the network, so this can be used, as a unmodifiable ledger to write. On the other hand, users can easily use the same feature to send private messages to other

<sup>1</sup>We can think of  $k_0 = 2$ , but this parameter can be adjusted to the network capabilities.

users by encrypting the message with the public key of the recipient. Then only the recipient can decrypt the message with his secret key. This basic type of transaction (with value and message only) is called a standard transaction and can be sent without any fee | users are "paying" for the transaction through approving other transactions in the DAG. Of course, transactions with 0 value are also admissible, so one can use IOVO as a platform for fast and free money transfers and messaging.

### 3.2 SCORING OTHERS

The main feature underlying all of IOVO's innovative applications is the scoring mechanism. Each scoring is a user-generated protocol<sup>2</sup> which collects partial scores about the target user and computes from them the user's final score. In the simplest case, a scoring can be a numeric-value scale in some category. Let's say there is an eBay-like application built on top of IOVO. Following each transaction, the buyer gives a partial score to the seller. Then the final score will simply be made up of the mean of all the partial scores. However, we can imagine much more complicated types of scorings, e.g.:

An insurance company runs on top of IOVO and every car incident involving a particular driver is recorded as a partial score in an IOVO transaction. Then the final score is the driver's insurance premium.

A bank (or a system of banks) runs on top of IOVO and every loan taken and every installment paid are recorded as a partial score in an IOVO transactions. Then the final score is the client's creditworthiness.

Moreover, the author of a scoring can also impose some parts of the score which do not necessarily come from IOVO transactions (e.g., some initial scores are given to the users, which is useful in the case where an institution moves its business to IOVO and wants to transfer the data which it has already gathered about its users. What is important, there is no single formula for computing the final score of a user | the scoring author can arbitrarily create all the rules and publish them as the scoring manifest.

It is worth noting that the score part of the transaction is free of charge, as well as its value and message. We will sometimes refer to the transactions containing a partial score part as scoring transactions.

### 3.2.1 NOTATION

We will denote all the scorings by  $S^1; S^2, \dots$ . The final score of user  $U$  in scoring  $S^i$  will be denoted by  $S^i(U)$ , and all the partial scores for user  $U$  in scoring  $S^i$  will be denoted by  $S^i_1(U), S^i_2(U), \dots$ . The partial scores are broadcast in the encrypted form using target user's public key  $pk_U$ :

$$E^i_j(U) = Enc_{pk_U}(S^i_j(U))$$

<sup>2</sup>Everyone can create a scoring and publish all its rules as a *manifest*. More on this will be covered later in the paper.

Therefore only  $U$  can compute his own final score from the public information.

### 3.3 SCRIPT

Every IOVO transaction can have an Ethereum-like script attached to it. It means, in particular, that a transaction can, for example, create a contract or call up another contract. Since the script can run long, script transactions are much more expensive for the network to handle. Therefore, a transaction with script requires  $k_S$  confirmations in the DAG (where  $k_S$  is some number greater than  $k_0$  and proportional to the script length).

### 3.4 REQUESTING A SCORE

The main building block of the IOVO system is the operation of *requesting* a score. In this operation, user  $A$  wants to know  $S^i(B)$  – the score of user  $B$  in scoring  $S^i$ . This score depends on all the partial scores  $(S^i_1(B), S^i_2(B), \dots)$  that appear in the transaction history in an encrypted form  $(E^i_1(B); E^i_2(B), \dots)$ . The only way to reveal the score is to evaluate the function  $Reveal_{sk_B}(E^i_1(B); E^i_2(B), \dots)$ , which can be done only knowing the secret key  $sk_B$ . Therefore the whole procedure of acquiring a score will consist of the following phases:

1.  $A$  collects all the partial scores  $(E^i_1(B); E^i_2(B), \dots)$  from the network.
2.  $A$  broadcasts a transaction  $Request(A; B; E^i_1(B); E^i_2(B), \dots)$  with  $C$  coins attached to it.
3. When  $B$  notices a  $Request$  transaction addressed to him, he (locally) computes his score using formula  $(s, \pi) = Reveal_{sk_B}(E^i_1(B); E^i_2(B), \dots)$ , where  $s$  is the computed score and  $\pi$  is a zero-knowledge proof that it was correctly computed on the given set of partial scores  $(E^i_1(B); E^i_2(B), \dots)$ . The proof  $\pi$  is important, since it is a guarantee, that  $B$  used all available data  $(E^i_1(B); E^i_2(B), \dots)$  and did not use any fake partial scores.
4.  $B$  broadcasts a transaction  $Claim(A; B; Enc_{pk_A}(s), \pi)$  to claim the reward of  $c$  coins. Score  $s$  is encrypted with a public key of  $A$  to avoid other users seeing the result (recall that all the transactions are publicly visible).

The  $Request$  transaction can be implemented as a time-locked Ethereum-like smart contract | it transfer  $c$  coins to  $B$  only if  $B$  will broadcast a correct  $Claim$  transaction within some given time period  $\Delta t$ . Then the  $Claim$  transaction will be in fact sent to  $Request$  contract (it will call a contract function). In case the  $Claim$  transaction is not issued within  $\Delta t$  time, the money will automatically go back to  $A$ .

Thanks to the mechanism of requesting a score, IOVO users are incentivized to actively participate in the network – they will claim the reward for revealing their score only in cases where they react to a request within the timeframe window  $\Delta t$ . This is important since active users approving other transactions are necessary for the stability and security of the currency.

Moreover, to further increase the contribution of these "revealing users" to the network, the system might be implemented in such a way that calling a contract function (as in the case of sending a Claim transaction) requires approving  $k_c > k_0$  other transactions. This can be done, e.g., using an Ethereum-like gas system | every low-level command in a contract code burns some gas which must be paid for (the currency for this payment is the number of other transactions to approve). Hence, complex transactions like Claim (contract calls) will require more other transactions to approve, while standard transactions (money transfers between users) will remain simpler (i.e. require only  $k_0$  other transactions being approved).

### 3.5 SEARCH ENGINE

The mechanism of requesting a score allows users to generate arbitrarily complex search queries through the network. Imagine user  $A$  wants to find all network users  $U$  whose scoring  $S^i(U)$  satisfies some condition  $\lambda(S^i(U))$ , e.g.,  $S^i(U) > T$ . Since all the partial scores are encrypted,  $A$  does not know in advance which users will satisfy the condition. He can surely send a Request transaction to every other user in the network, but then he will be obliged to pay every requested user, even those not satisfying the condition. Instead, user  $A$  can send a modified transaction:

$\text{CondRequest}(A; B; (E_1^i(B); E_2^j(B), \dots \lambda)$

which is a conditional request | one can claim the reward only if he reveals a correctly computed score  $S^i(U)$ , such that it satisfies the condition  $\lambda(S^i(U))$ . By doing this, one can create arbitrarily complex search queries and pay only the set of users which satisfy the filtering rules".

### 3.6 NEW SCORING CREATION

At any given time, every user can create a new scoring by publishing its manifest. A manifest is a transaction whose script contains a set of rules that specify what partial scores are allowed and how to compute the final score from the partial scores | among others it contains the code of Reveal function. Every time a user refers to a scoring  $S_i$ , it is referred by the hash of the transaction containing its manifest. Purposely, there are no restrictions on the rules of creating a manifest | any manifest (written correctly in the IOVO scripting language) can be published. In particular, the author can freely set the rules for paying for revealing the scoring, e.g., he can introduce a fee for every scoring revealed which is paid to him. It is, however, in his interest to introduce such rules so that users are more likely to use his scoring.

## 4. ECONOMICS OF IOVO

By design, everything in IOVO is free | there are no fees paid to miners or founders. Instead, all the financial aspects are relegated to the authors of scorings | the only fees that the user is required to pay are those introduced by the author of a scoring, and the user can't be forced to use a particular scoring. The free-of-charge transactions in IOVO are possible thanks to an innovative transaction DAG technology. It outperforms traditional blockchain technology, which is limited by its restricted block size and need for miners. The security and fluency of DAG technology is broadly discussed by the authors of IOTA [2].

### 4.1 EARNING WITH IOVO

In the most probable scenario, the scorings will be created in such a way that there will be a fee for requesting a score. The user who reveals his score will be paid from this fee. Moreover, many requests will be directed to some narrow set of most valuable users in some category. Therefore users are incentivized to actively participate in the network in order to claim the rewards for revealing their score, they are incentivized to maintain the highest possible scores, to be included in as many possible narrowed search requests as they can.

## 5. SECURITY

### 5.1 TRANSACTION DAG

The topology of transaction DAG in IOVO is identical to the IOTA tangle, so all the security properties described in [2] hold also true for IOVO. In particular, the process directing incoming transactions can be modeled as a Poisson process with rate  $\lambda$ . In this model, after some adaptation period, the total number of tips (transactions with no confirmation) will converge to oscillate around some number

$$L_0^{(k)} = \frac{k\lambda h}{k-1}$$

where  $h$  is the average time a device needs to perform the calculations required to issue a transaction and  $k$  is a parameter of the network which shows how many other transactions must be approved by the incoming transaction. The typical duration of the adaptation period can be derived to be

$$t_0 \approx 2.84 \cdot h \ln L_0$$

The authors use this model to prove that the tangle is resistant to double spending attacks, where a user tries to spend coins that were already spent in another transaction. Furthermore, they claim that using the MCMC (Markov chain Monte Carlo) tip selection algorithm makes the tangle secure against a parasite chain attack in which an adversarial user secretly builds his own subtangle and eventually publishes it, outpacing the official version of the tangle.

### 5.1 SCORINGS

Scorings in IOVO are constructed in a way that guarantees their security and integrity. Firstly, all the partial scores are encrypted with a public key from the target user, so only he can encrypt it and no one can get any information from them. Furthermore, the final scores are computed locally, so no information from this computation is leaked to the network. Finally, the correctness of the computed score can be easily verified using the zero-knowledge proof (and, by design, no other information from this computation is leaked).

## 6. PIONEERING MARKET MAKER: INFLUNOMY

### 6.1 INFLUNOMY INTRODUCTION

**CHALLENGE:** The organisation of socioeconomic life in the time of global media lacks a clear understanding of the influence ecosystem paradigm that would allow for its comprehensive management.

**SOLUTION:** An influnomy market maker platform for value-centric influence exchange ecosystems.

**The movement within the contemporary digital influence economy and based on the IOVO DAG is called influnomy** - it refers to influence economy. This is a very old, but now dynamically expanding part of the overall economic system, just as social and sharing economies are. The idea is to facilitate the exchange of other personal assets than money, starting with social media consumers' behavioural influence. The emergence of the influence economy paradigm has so far simplified the understanding of 'influence' to 'brand influencing', not allowing for the direct exchange of other influence-based unmonetised human assets. Influnomy solves this challenge by becoming a base layer for all possible influence exchange markets and DAPS.

## **The exchange of unmonetised assets**

Nonmonetary exchange projects are now focused on brand influencing because of the growth of the influencer marketing market. IOVO will certainly supply tools for this area, but at its core, it lays down not only its commercial applications. IOVO is poised to rate and allow the exchange of all individual and institutional unmonetised assets and the commercial market will be included in its applications. Nevertheless, it is the nonmonetary and strongly noncorporate means and tools of exchange that will become fundamental for the project.

The elimination of money's primary functions (e.g. medium of exchange) will bring an end to nominal prices and to the millennia-old paradigm of product-price, challenging the global transactional order. Coming from friction to seamless economy we will witness the systemic shift of the economic goods and services exchange circuit to a decentralised P2P network exchange that includes and trades non-monetary assets (eg. influence, knowledge transfer, human capital) subjected to new metrics (e.g. Return On Value in place of Return On Investment).

The primary asset of this emerging economic ecosystem within the Internet of Value will be influence (consumer attitudes and behavioural influence). Creating the full-scale influence economy, the first transactional framework will be created for this most desired value-asset. "Fiat money" (centralised, nominal) will be overtaken by "asset money" (potential), making the influence economy an inevitable successor of earlier instantly corrupted sharing and social economies.

The economy is now evolving at an unprecedented pace. It's developing both by expanding to other areas of life and by instating internal changes of paradigms – such as the shift from industrial economy to services, globalisation and decentralisation, and to the newest paradigms of sharing and social economies. By becoming more and more digital and further deepening the digitalisation of social networks, the paradigms of promotion and marketing continue to grow, spanning one-sided advertising communication, two-sided consumer dialogue, contemporary marketing is reaching for existing influence networks that engage and for third-party endorsements to relay the desired conveyed message.

Within this last, newest paradigm the advertising budgets are allocated more and more rapidly to the private channels owned by digitally influential individuals that strengthen the message within their online fanbase and circle of followers. The currency of this new online ecosystem is influence, which – just like the values in social economy – is now an exchangeable asset.

## **Beyond brand influence**

The potential of the influence economy goes well beyond online brand influencing. The credibility and quality of network reach allow for the proliferation of all kinds of immaterial values. This current marketing paradigm (influence economy - influnomy) is subject to a new branch of social sciences - influnomics. This area of knowledge will develop rapidly by describing and diagnosing social mechanisms ruling the new paradigm of value exchange that will be based on partially barter-oriented systems facilitating the exchange of individual influence potential for benefits that are not necessarily monetary. The IOVO blockchain and the influnomy market making platform are designed to achieve a span that is much wider than the simple brand influence idea other projects limit themselves to. In line with the primary blockchain values, IOVO and influnomy build on that blockchain will drive nonmonetary human capital asset values as a major asset for interchangeable services equipped with a proof of trust protocol to establish publicly-recorded ledgers of human capital market worldwide.

The human value assets that will be made exchangeable in the near future are i.a.: influence, time, skills, network, knowledge, trust, reputation, status, vote. Those values will be the operating ground of the emerging Internet of Value reality and as such will soon be subject of fully operational tools and instruments developed on the IOVO blockchain.

## 6.2 FIRST DAP: FAYM

**CHALLENGE:** Consistent lack of real-world integrated influence exchange platforms allowing for seamless, direct and immediate benefits awarding. Lack of “unused” influence benefits transparent and fully operational platform.

**SOLUTION:** The first platform for influence exchange as the core exchangeable value (anchored in the influence economy paradigm - influnomy©) - FAYM. It is a multi-sided transactional hub/node and barter tool e.g. for the tradable influencer marketing services exchanged within the previous economic value for nominal price.

The Internet of Value shifts the economic paradigm to a decentralised P2P network exchange of nonmonetary assets (eg. influence). In the age of rapidly diminishing intermediaries we are now experiencing birth of a new decentralised system that brings the post-monetary reality to life, where money as an intermediary will eventually not exist in transactional framework.

**Influnomy’s first commercial application based on the IOVO DAG is a product is called FAYM** - an app and an online marketplace. It allows users to discount their payments by posting the social media content desired by a place/product/brand, etc (special dashboard for influencer marketing automation). On the consumer side, it all happens seamlessly, as the information about the monitored fact of promotion goes through the database and is transferred to the payment terminal (applied right away). The discounts can stay unused and can be traded on the blockchain market we designed and programmed. Other nonmonetary assets (e.g. knowledge) will also be tradeable in this marketplace.

### **Pay with posts. Pay with FAYM.**

Influnomy is an ecosystem for the globally connected influence economy. It is dedicated to facilitating the coming of the fully operational Internet of Value (IoV) and is built around the IOVO DAG, with fundamental blockchain ethics and technology at its backbone. The influence economy (influnomy) supplements earlier social and sharing economies. The analytical approach of influnomics aim to describe and design facilitation of exchange of the non-monetary asset of influence.

Built on the IOVO DAG, the FAYM app enables direct nonmonetary (discounted) payments based on externally audited influscore®. FAYM is the first application within the paradigm of the influence economy for the Internet of Value. It is an online/mobile transactional framework that automates influencer marketing by connecting it directly to the payment systems. FAYM allows a direct exchange of the nonmonetary asset of influence for the benefit of lower price.

**A. INFLUSCORE.** Users get an influence scoring in different areas (e.g. sports, beauty, lifestyle).

**B. MARKETPLACE.** Brands/products/services/venues offer discounts dependent on Influscore and desired social media action.

**C. CARD TOKENISATION - PAYMENT.** The discounts are seamlessly processed within the payment system after complete integration base on the credit/debit card tokenisation technology (card becomes ID). In the next stages of the FAYM platform, discounts acquired by trading online influence will become fully tradable with the influnomy ecosystem where influence as an asset value will be tokenised. The FAYM app is dedicated to everyone willing to exchange non-monetary assets (e.g. social media consumer behaviour influence) for benefits such as discounts and freebies. Because it is a multisided platform, its customers are both products/brands/services/venues and consumers willing to automate their influence benefits.

FAYM app is designed within the paradigm of the influence economy (joining the existing sharing and social economies). It solves the problem of closing the online and mobile global circuit of exchange in the coming age of the Internet of Value (IoV). Bringing together different fields, such as transactional payment networks, influencer marketing automation and loyalty programs, it answers multiple market needs and solves real-life insights.

## 6.2 FIRST DAP: FAYM

### A. The product creates a synergy between existing business categories:

social media influence scoring, online discounts marketplace, loyalty programs and innovative payment systems. The synergy of those areas will bring unprecedented traction to the system.

B. As an Internet influencer platform, the product will gain early traction and be promoted by a worldwide influencer network. Depending on their scoring, the influencers will be invited to join the platform on three separate levels:

- a. Infleuncer (up 100,000 followers),
- b. Influnomist (100,000–500,000 followers).
- c. Influminati (more than 500,000 followers).

The project combines different product and services areas, which is more than a competitive advantage. Just like Facebook at the beginning, it brings together different services, to create a new quality of product. Being able to freely build upon a global network of influencers-users will allow for an intensive trend spreading and user base growth.

The overall objective is the launch of the FAYM interactive mobile platform as a comprehensive tool, unique on a global scale, for the automatization of an innovative market paradigm – the influence economy. Developing these tools in an objective fashion will define the ‘value’ of the impact of a single individual (or group) and devise a unit of measure to establish that individual’s potential impact on future activities carried out by another set of individuals. The data will hold a particular value for the advertising market, opening up new ways of entering the market both for ‘influential’ individuals, along with corporate entities eager to take advantage of that individual’s value in marketing the company’s goods or services. The system makes it possible to turn activities which had thus far been carried out on a haphazard basis into conscientious, strategic decisions. The economic benefits traded for influence will be further interchangeable within the designed IOVO DAG framework, solving the most troublesome disadvantage of cryptocurrencies – the volatility caused by the lack of real-life world economical foundations that function on an everyday basis. Subsequent paradigm applications within the open protocol for the influence economy are, e.g.: fixing loyalty incentive structures, influencer equity crowdfunding, universal global MLM network, the barter trade ecosystem and other future problem-solving opportunities.

IOVO provides a DAG infrastructure dedicated to the Internet of Value and will work toward all possible implementation possibilities and applications of any imaginable nonmonetary value, as well as asset scoring and exchange systems.

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